THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVII. No. 1710.] LONDON, FEBRUARY 18, 1896. [48TH YEAR. PRICE 6d.

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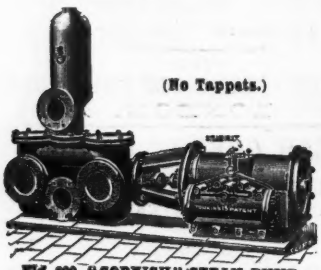

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Fig. 600. "CORNISH" STEAM-PUMP FOR WATER.

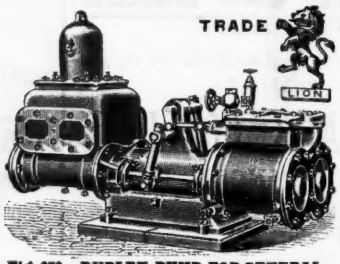

Fig. 670. DUPLEX PUMP FOR GENERAL PURPOSES.

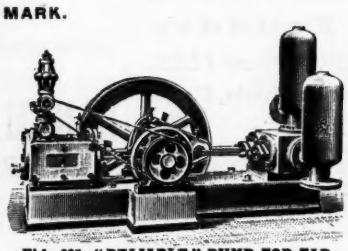

Fig. 685. "RELIABLE" PUMP FOR TAR AND THICK FLUIDS.

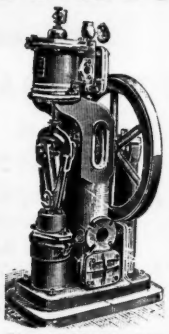

Fig. 705. SINGLE RAM PUMP FOR BOILER FEEDING, &c.

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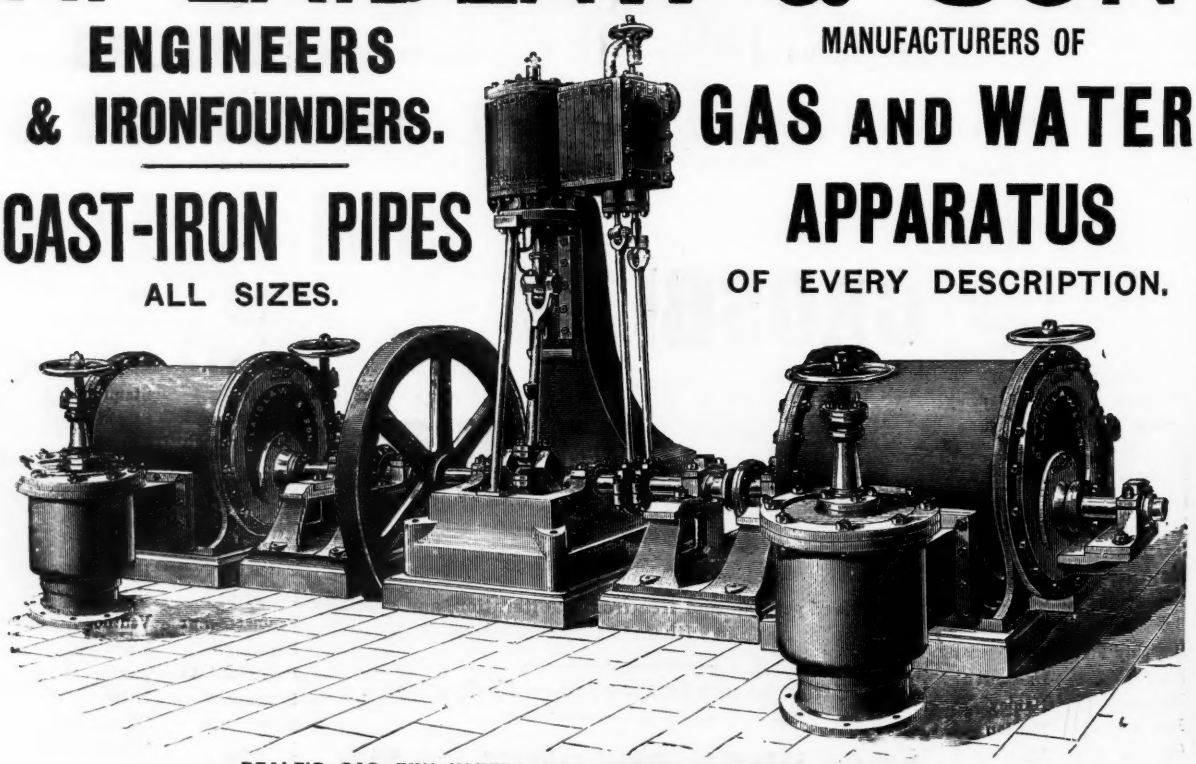

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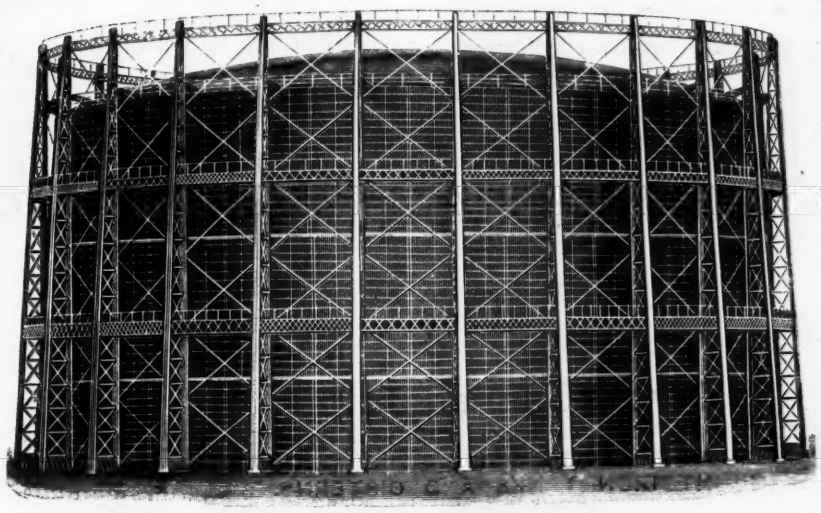

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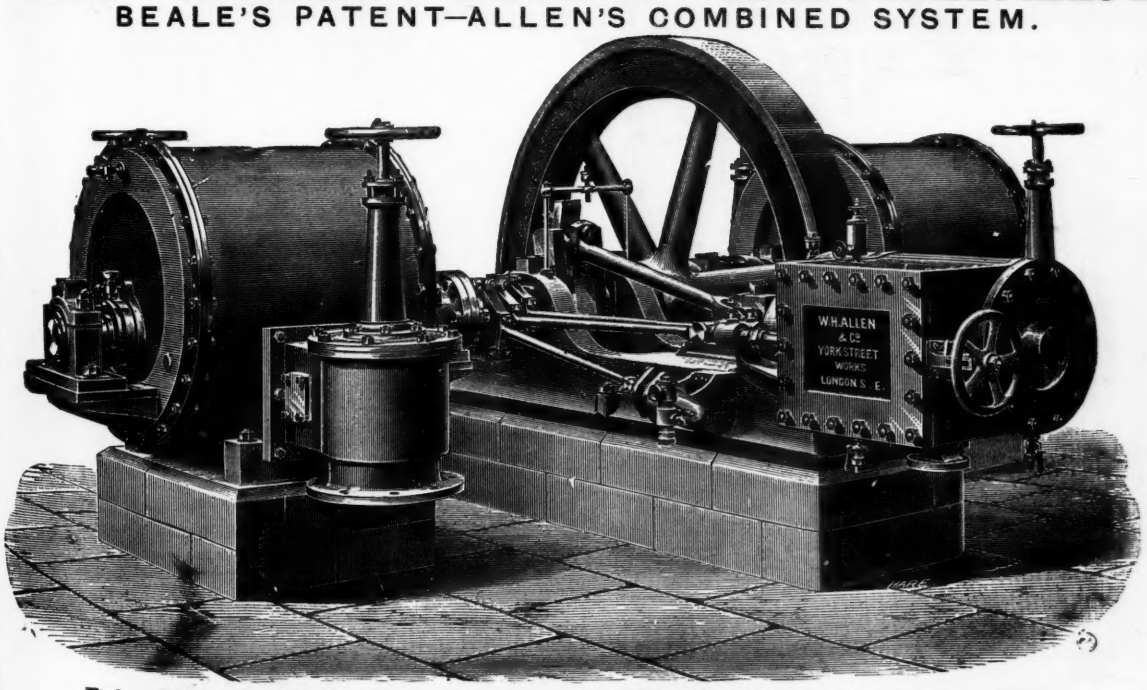

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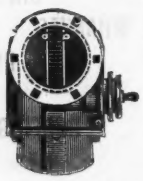

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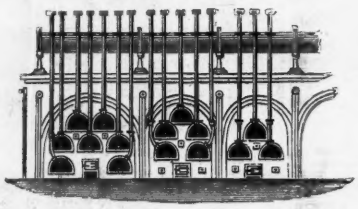

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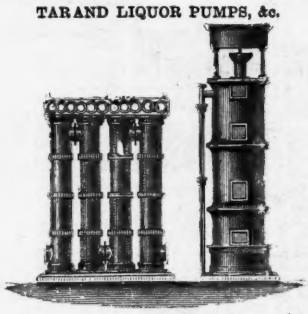

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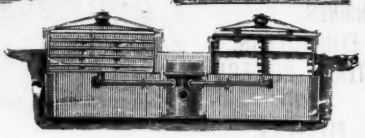

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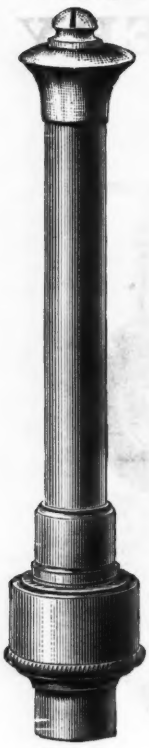

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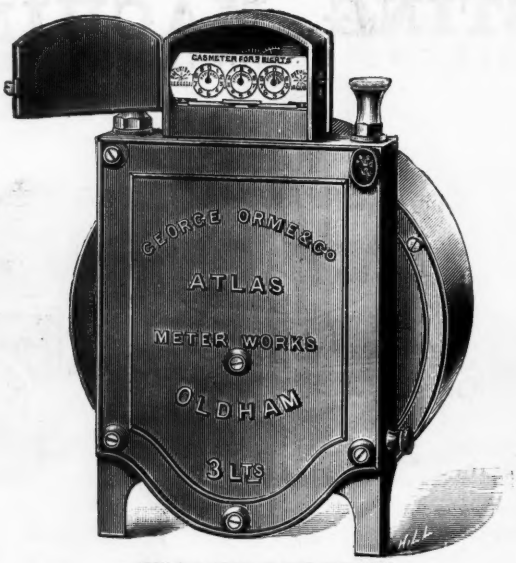
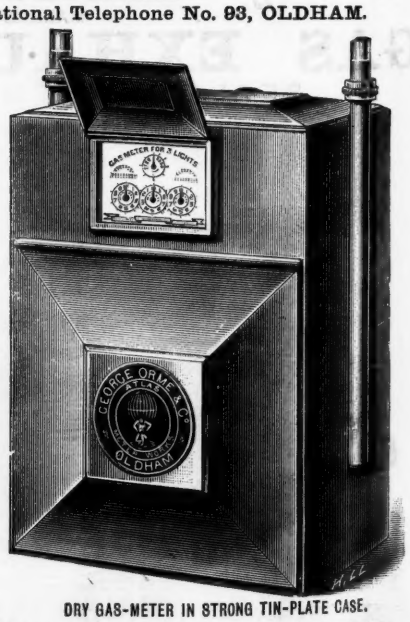


WET GAS-METER IN CAST-IRON CASE.



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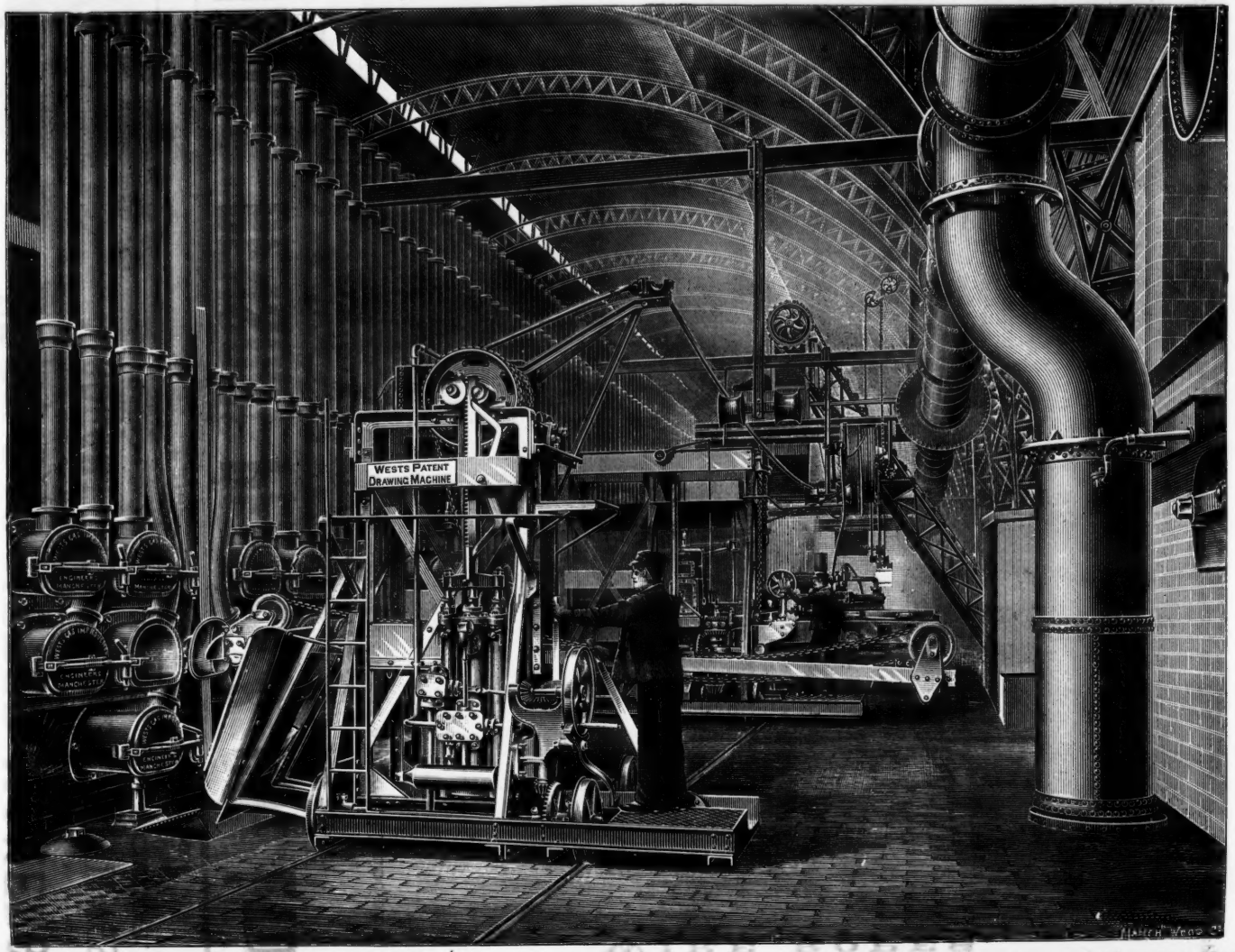

Interior of Retort-House at the Bradford Road Gas-Works, Manchester, showing the Compressed-Air Drawing and Charging Machines.

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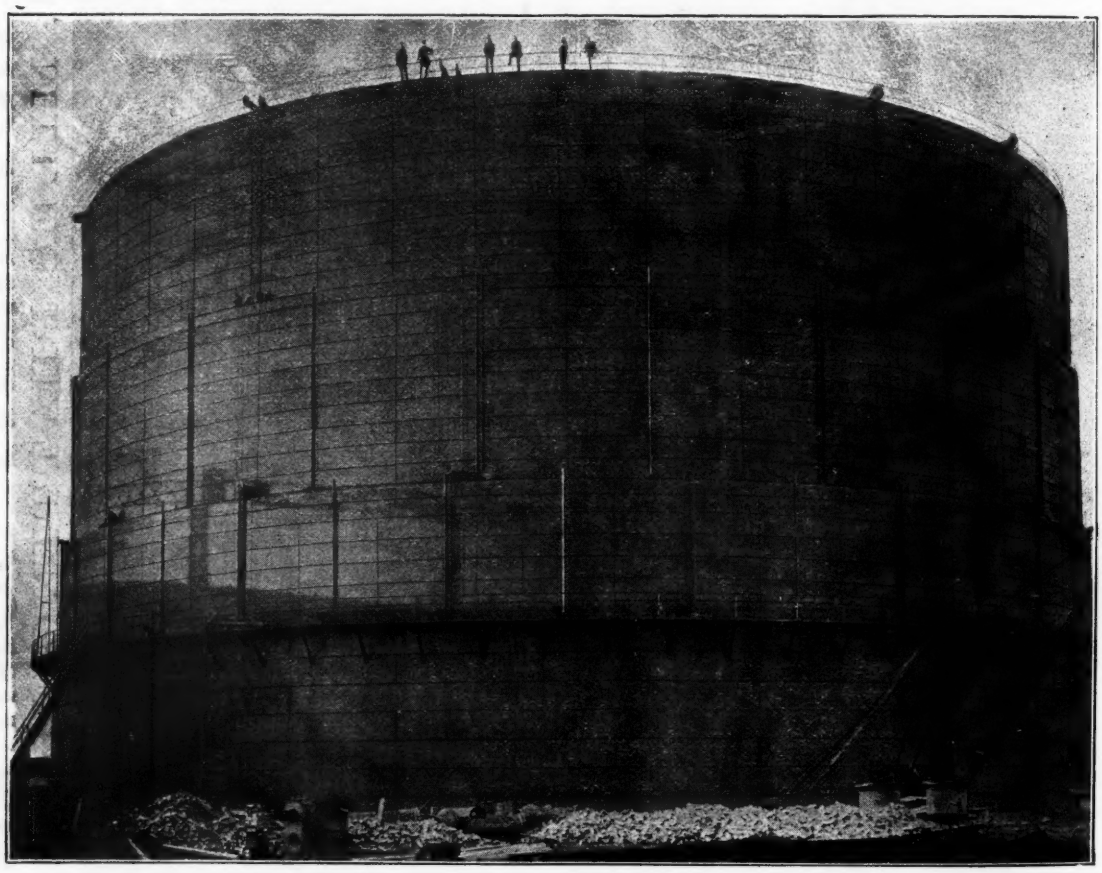

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(2) The illuminating power given by the Incandescent Gas-Burners, consuming 3·78 cubic feet of gas per hour, was found to be equal to 60 candles. That given by the flat-flame burners, consuming 10 cubic feet of gas per hour, was 26 candles.
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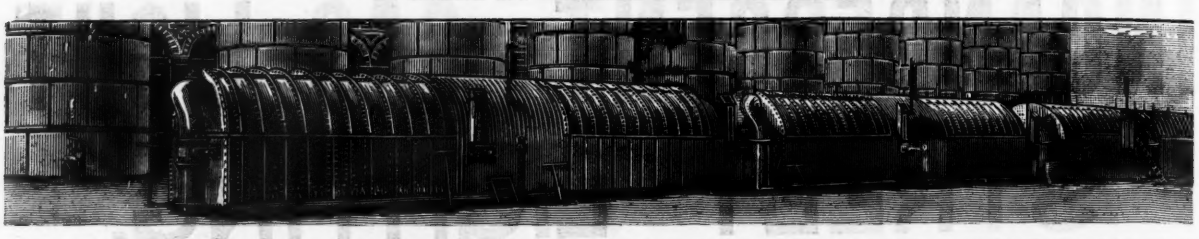

View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have 30 of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

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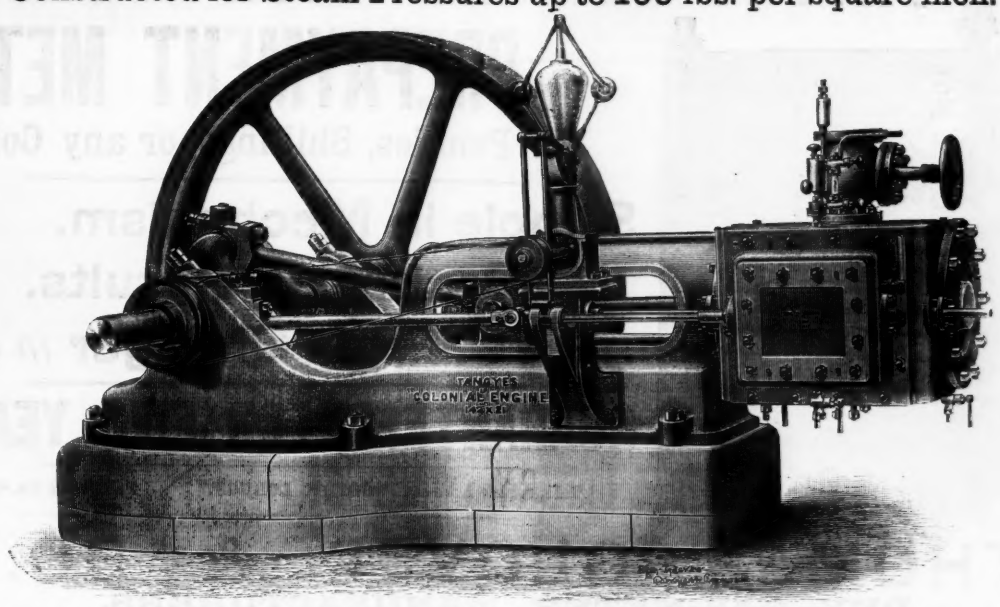

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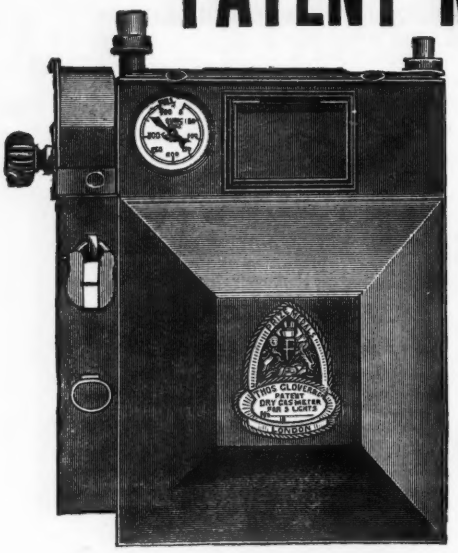

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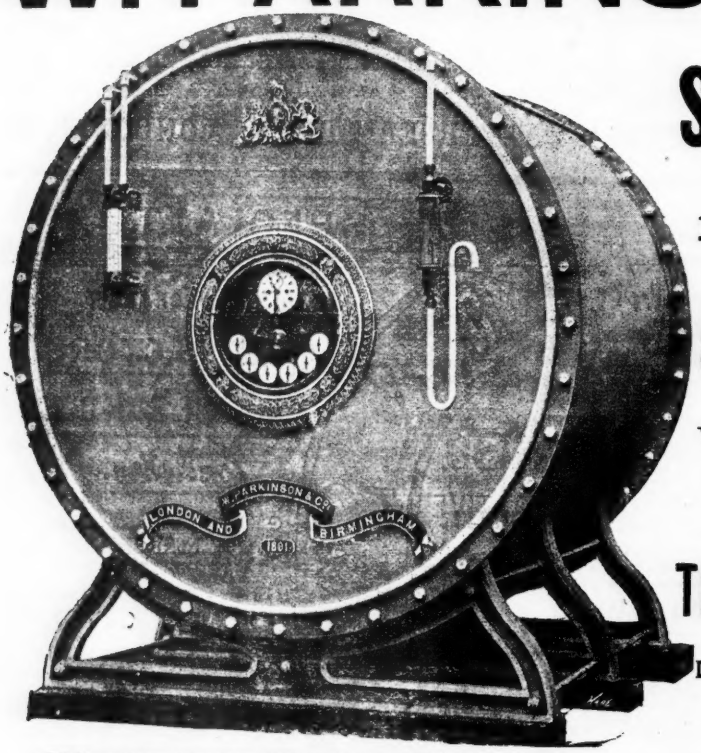

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EDITORIAL NOTES.

The South Metropolitan Meetings.

THE South Metropolitan meetings of last Wednesday do not call for much comment here, though the report of the proceedings thereat occupies so much space elsewhere. As we anticipated, the Chairman (Mr. George Livesey) did not speak very long in moving the adoption of the report and accounts; but, within the limits he allowed himself, he contrived to make several highly effective points, not all without reference to the "good neighbours" across the river. Indeed, he began with an explanation and correction of a small error in the paragraph of the report relating to the Company's purchase of coal, which gave him an opportunity of informing his audience that when The Gaslight and Coke Company buy coal, they insist on a clause in the contract providing that the South Metropolitan Company shall not purchase from the same contractors at a lower rate. A remarkable rendering of the "higgling of the market" by the Horseferry Road "Department of State"! Having made this interesting disclosure, and breathed a note of defiance, Mr. Livesey turned his back upon the Horseferry Road, and for the rest of the day devoted himself strictly to the domestic politics of the South Metropolitan Company. There was enough to be done in this regard during the one afternoon to absorb the energy of the strongest of Chairmen. Mr. Livesey rose to the occasion; but though he could finish with a laugh, feeling that the day was his own, the two-and-a-quarter hours spent in the crowded room of the Bridge House Hotel must have been an arduous time for the Chairman and his colleagues.

In his first speech, Mr. Livesey expounded the data in respect of capital burden and cost supplied by the Company's recent operations; showing in what the value of new business to an old gas undertaking consists. He also discussed the question of the true purpose of a gas company's reserve fund, and laid down the new proposition—new, that is to say, as a general principle in his Company's polity—that such a fund should not be relied upon to meet a stress due to an advanced price of coal. This is what the Company have done in past times; but it was declared that the Directors would not act in the same way again. Of course, it is open for anybody to observe that they have no choice, inasmuch as the huge reserve fund upon which they drew for this purpose on the last occasion is gone, and is not likely to be restored to the pristine bulk. Enough was said at the meeting, however, to indicate that the disappearance of this store is not regarded by the Board as an unmixed evil. Indeed, for the strictly limited objects sketched out by the Chairman in formulating his new theory of the reserve fund, a very moderate sum will in all probability serve. The South Metropolitan Board have perhaps learnt this lesson from the municipalized gas undertakings, which have no reserve at all, but adjust the selling price of gas to the cost of coal after an informal, yet very real, sliding-scale.

The extraordinary meeting was reached after half an hour's consideration of the report and accounts; and then the procedings became, if not precisely lively, at any rate more varied. The existence of opposition to the policy of the Board was manifested in two quarters. Circumstances have changed slightly, but not unimportantly, since the last extraordinary meeting of the Company took place; and, as a consequence of the change, the new stock-conversion scheme does not satisfy all classes of stockholders equally. A representative holder of "B" stock occupied a good deal of the time of the meeting with an expression of his fear lest in a particular eventuality this class of stock might be subjected to some slight detriment. But the general wish of the meeting was very strongly in favour of the scheme proposed by the Board. The second source of opposition was a representative capitalist, who did not like the idea of the proposed workman-director, and said so at great length, with no little ability and some acerbity. He did not produce any new arguments or pertinent proofs on his own side; and he appeared insensible to the course of public affairs, which has put men of the working class into positions quite as responsible as that of director of a statutory gas company. It is truly remarkable how people of a certain mental habit will swallow the "guinea pig" while revolting against the idea of the genuine workman-director. The Chairman briefly defended his views in

this regard, while resting the case mainly on the vote of the proprietors taken on the former occasion. Mr. Livesey has every reason to be satisfied with the results of the meetings; and he will be able to face the Parliamentary Committees with the access of strength that comes from knowledge of having the support of those with whom one has held candid counsel not once, but many times.

The Mystery of the London Coke Trade.

THE letter which we publish to-day, disclosing the personality and expounding the motives of the "mysterious cement maker" whose proceedings were denounced at the meeting of The Gaslight and Coke Company as constituting the *fons et origo mali* in regard to the Metropolitan gas coke trade, is cordially welcomed. The interested public have a right to know the facts of this business; and if the effect of the present disclosures should be to deliver the coke trade from bondage to false principles of dealing, and consequent unfair practices, the end will be a full recompense for any painfulness felt by individuals in the beginning. It now appears, from Mr. Bevan's statement, that the custom of yearly contracting for the sale of London gas coke has enabled all the Gas Companies to "put the screw upon" the cement manufacturers in a way that these large buyers of coke regard, with some reason, as unjust. Of course, there are two sides to the question of who should be entrusted with the accumulation of those stocks, the possession of which is the key of the commercial position. Mr. Bevan says that it has been the policy of the Gas Companies, without distinction, to keep the cement manufacturers short of coke; and it is very obvious that, from their point of view, the Companies have a commercial justification for this policy. If the mastery of the stocks were once to pass to the buyers—as Mr. Bevan now implies has been effected in his own case by his acquiring more coke than he wanted for more than it was really worth—the Gas Companies might be forced to take whatever price might be offered for their output. The position is complicated, moreover, by the subsidiary—which is in one aspect the paramount—question of the action of the largest coke producers in exporting what they call their surplus coke at prices far below those they exact from those buyers, whether by contract or otherwise, from whom they derive the bulk of their revenue. This is an old trouble, not by any means confined to the London coke trade. It exists, in modified shape, wherever a gas undertaking attempts to maintain a coke market against the depressing influence of its own over-production. The output of coke does not necessarily correspond to the needs of the particular district in which that coke is produced. The district, whether the local consumers of the coke are small or large purchasers, will pay a price for the commodity which the producers have been in the habit of regarding as normal; but they can only absorb a certain quantity of it. Here the temptation arises for the producers to send away their superfluous coke for anything it will fetch; and those who adopt this expedient defend it upon the ground that it would be merely giving away a legitimate profit to reduce the price locally, since the home consumption would not be increased in amount by selling at a lower price, and there would still be the surplus to get rid of for anything it will fetch elsewhere. This way of dealing with coke is generally kept within bounds by the fear of cross-competition. It is obviously absurd (say) for A and B to endeavour to keep up their own market prices by exporting surplus coke on terms which permit of retailers underselling each by favour of the other. Still, we do hear of this kind of thing occasionally.

The case of London coke is peculiar. The cement industry of the Thames and the Medway finds the contracts upon which the London Gas Companies have been in the habit of relying to fix the wholesale value of their coke. To the cement manufacturers, coke prices are an important element in the cost of working; and they naturally try to get their supplies at as cheap a rate as possible. They complain that the Gas Companies are not only hard bargainers, in the ordinary commercial sense. This they could put up with; but they have a still greater grievance in the practice of the largest of the coke producers—that is to say, Beckton—exporting coke to Continental cement manufacturers at prices which are not conceded to themselves. There is nothing fresh in the idea expressed at the recent meeting by the Governor of The Gaslight and Coke Company, that if the English cement manufacturers will not pay the Company's price for coke, it must be exported. This, Mr. Bevan declares, is no more than the Company have been doing for years. Not merely do they screw the last penny out of their Thames and Medway contractors, but they also sell to the German rivals of these cement manufacturers coke at prices which enable the former to oust the staple of the latter from the universal market. It is the old story of the injury done to home producers by the railway companies in carrying foreign stuff at cheaper rates; only in the case of the coke trade, the mischief is particularly evident.

Let us hope that the whole business will now be completely threshed out, so far at least as correspondence will do it, in our pages, and the way cleared to a better state of things. A few hard terms have been used in the controversy, but nothing more than might be expected from men whose gravest worldly interests are at stake. This question of coke contracts and sales is of such serious and far-reaching importance, that no small official or personal considerations ought to be permitted to hinder its complete and lasting solution with the briefest delay.

Illicit Commissions.

A CASE heard recently in the Lord Chief Justice's Court, in which a commercial traveller sued his former employers to recover damages for wrongful dismissal, afforded the head of the English Bench an opportunity for once more speaking very strongly on the pernicious "commission" system. The plaintiff was stated to have succeeded a traveller who had been in the habit of giving commissions on his own account to the representatives of firms from whom he obtained orders; and when his employers became aware of the fact that he was preparing to follow this example, they summarily discharged him. Thus the case, so far as the actual payment of commissions went, was not by any means a particularly heinous one; and we fear that among some of the "commercial gentlemen," and even the employers of these agents of trade, who read these lines, there will be a few who could tell a tale very much more to the point. Upon the statements brought before him, however, the Lord Chief Justice declared that "there "were no cases more important to the commercial interests "of the community than those touching the paying and "offering of illegal commissions. These commissions sapped "the very life of commerce; they corrupted buyers and "sellers, employers and employed; and placed a direct "premium upon dishonest trading. . . . It was utterly "immaterial out of whose pocket the commissions were "to be paid; it would most unmistakably be conduct "calculated to injure the defendant firm." His Lordship went on to observe that he had once referred in the Court to a painful experience of his own in connection with the evil system, and said that the publication of his remarks had brought him a volume of correspondence from all parts of the country. He repeated the story of how two men were convicted of conspiring to defraud an important firm of manufacturers using dye-stuffs in their business. One was an employee having a voice in the placing of orders for these dyes; the other was a drug merchant who had for many years carried on a large concern, and had occupied a prominent position in his own neighbourhood. "These two had conspired together that goods of inferior "quality should be invoiced at high prices; and the firm "had lost large sums. The tradesman said that if he had "not paid any commissions, he would have had no orders "from the foreman; while if he had given an explanation to "the principals, that foreman would have been dismissed, "and the next would have complained of his drugs." Of course, after this the jury returned a verdict for the defendants in the case before them.

The fullest publicity should be given to such cases; for the evil is still rampant in many branches of commerce, and will be extremely troublesome to eradicate. This end can only be attained, if at all, by working upon the fears of the worst offenders. The go-betweens in this degrading traffic—the commercial travellers—are often greatly to be pitied; for upon them falls most of the dirty work, while their reputedly respectable employers pocket the reward. It is to be wished that those in a position which exposes them to the temptation referred to by the Lord Chief Justice, would check the mischief at its source by having nothing to do with commission-paying firms. This may seem a vague aspiration; but, in reality, as most of our readers are only too well aware, this thing is pretty well

understood. The actual payment and receipt of illicit commissions is essentially a secret transaction; but there is about its habitual practitioners an aroma that betrays them. Meanwhile, as a practical step in the right direction, it should be a rule of persons on whom suspicion might rest by reason of the nature of their position in, or in regard to, the mercantile community, to offer the smallest possible ground for attack, by keeping business connections in their proper place. It is better for a public officer to condemn himself to a life of isolation than to be too free in associating out of business hours and business places with commercial men; and those of the latter order who persistently force themselves upon the former at other times, must be prepared to have their motives questioned and their reputation imperilled.

The Voting Rights of Shareholders in Parliament.

As was suggested in these columns on the 4th inst., the subject of shareholders' rights to vote in legislative and administrative assemblies in respect of matters in which they have what the legal mind has construed as a direct interest, has cropped up in Parliament. In connection with the debate upon Mr. Labouchere's proposed amendment to the Address relating to the Chartered Company of South Africa, Mr. Pickersgill asked the Speaker whether, in the event of a division being taken, those members of the House who are either directors or shareholders of the Company would be entitled to vote. In reply, it was stated that, so far as the House of Commons is concerned, the question whether or not a member is entitled to vote is one for the House itself, and can only be decided by a motion, in case he should vote, that his vote should be disallowed. The Speaker went on to say that the only assistance he could give was to state the rule that a member who has a direct pecuniary interest in a question ought not to vote. But there have been some conflicting decisions by the House itself on such questions; so that the Speaker appeared glad to be able to decline the responsibility for clearing up the point. Mr. Thorburn having inquired whether a member, being a director with a direct interest in a railway, is not entitled to vote on any Bill affecting the company, received the further answer that the House has on more than one occasion allowed the vote of a director of a company on a Bill promoted by the directors. On other occasions, a "somewhat con-"flicting" decision has been given. This is British parliamentary practice all over. Commenting upon the point raised, the "Daily Graphic" calls the rule "a counsel "of perfection," and demands to know "where the line is "to be drawn, or where, in some cases, the disinterested "member is to be found." It is also observed in the "Globe" that the rule in question dates from an epoch when limited liability had not been invented, and when it was much easier than it is now to define the lines of direct pecuniary interest uniting men and affairs. Unhappily, what is a mere rule of Parliament, which can be applied or not in the discretion of the members as a body, is really incorporated in the law of local self-government, and must be administered with the rest of the statutory regulations applying to municipal corporations and local authorities. It is high time that something was done to remove existing doubts respecting the scope both of the parliamentary rule and the municipal law. But it must be conceded that the task of defining what in all instances constitutes a "direct pecuniary interest" in such a connection is a formidable one. After all, the House of Commons arrangement for deciding every question of the kind upon its merits is probably the safest, provided that those upon whom the rule may be supposed to operate manage their votes in accordance with the suggestions of a robust common sense. The House can disallow a vote which it thinks ought not to have been given; but no power can compel a squeamish member of the Legislative Assembly to record his vote, if he entertains any conscientious doubts as to the expediency of his acting in the matter at all.

Lectures on "Water Supply" and "Light" at the Royal Institution.—The Friday evening discourse at the Royal Institution on the 21st inst. will be delivered by Dr. E. Frankland, F.R.S., on "The Past, Present, and Future Water Supply of London;" and the following day, Lord Rayleigh, F.R.S., will commence a course of six lectures on "Light."

WATER AND SANITARY AFFAIRS.

The announcement contained in the Queen's Speech, that a measure had been prepared "for amending the law with "respect to the supply of water to the Metropolis," came as a surprise to all parties. The phraseology employed seems rather minimizing; and yet we cannot suppose that any measure dealing with only a subordinate part of the main question would be honoured with reference in Her Majesty's Speech. More may be known by the time our remarks are published; but, in the interval, conjecture is rife as to the exact nature of the Government Bill. That Parliament will be asked to legalize a more rigorous system of control over the Water Companies seems scarcely to go to the length that may be reasonably expected. It is scarcely possible that the Bill can fall short of providing for the transfer of the water supply to a public authority. That the London County Council will be this authority, wholly and solely, is extremely unlikely. Even if the outer areas were cut off, and the functions of the Water Authority limited to the present Administrative County, a Conservative Government would be mindful of the civic powers, and give the Corporation of the City a place, by representation, in the governing body. But the exclusion of the outer areas is altogether improbable; and in that case the County Council becomes an unsuitable power for dominating over the whole "water "area" as comprised in the parliamentary districts of the Water Companies. The only appropriate authority would be one which represented the interests of the whole of the consumers who are now dependent on the eight Metropolitan Water Companies. An authority thus constituted may be called a Trust or a Water Board; and it may include representatives from the London County Council, the Corporation, and the Local Authorities connected with the outside localities supplied by the Companies. To a body thus constituted, the whole of the present undertakings could be transferred; and such a transfer could be effected with little friction, providing the terms of purchase were fair and equitable. That the public and the general body of consumers would be any better off for the change, we doubt. The very alteration itself would be costly, as all alterations are. The moving spirits in the County Council may be credited with knowing this; and therefore they wish to buy at a cheap rate, so as to hide the financial disadvantages which will ensue.

The resolution adopted by the County Council three weeks ago, approving the principle of entrusting the water supply to a public authority, but leaving it to Parliament to settle what the authority should be, may be considered to meet with a response in the coming Bill. Peace between the Progressives and the Moderates on the water question was established on the basis of this resolution. If the Government Bill at all resembles that which we have anticipated, it may be said that the County Council are already committed to it. But how can the Transfer Bills be revived, or the Welsh scheme pressed, now that the Government have undertaken the question? The Moderates have frequently been accused of "killing" the Transfer Bills. It would seem that the Government are now going to slay the slain; for the Bills will be doubly killed. Yet the Joint Parliamentary and Water Committee, by a report which they will present to-day, seem to think that the Bills are really not dead; and they advise that progress with them in the House of Commons be still undertaken, subject to a postponement. As for the attitude of the Council in respect to the Government measure, while it ought, by consistency, to be one of acceptance, there will unquestionably be an objection to the terms of purchase, if these are at all equitable in their character. That the Government will propose anything like the plundering policy of the Council, is utterly unlikely; and on this ground there will be a show of fight on the part of the Progressives. But the County Council may as well be quiet, as we advised them a short time ago. Thanks to their own headlong procedure, the water question is slipping out of their hands. If it comes to pass, as we have fair reason to anticipate, that the water supply of London and its environs will be entrusted to an authority created for the purpose, the event may perhaps be taken as an omen of something more to follow. The Government of London is not yet settled; and although the Council are trying to make fast friends with the Vestries, municipalization may

come in a form which will leave the Council, as a ruling power, shorn of much of its present pretensions. As for the Welsh scheme and the long report thereon, which is to come before the Council to-day, with a proposal to expend a further sum of £10,000 in preparations for bringing out a Bill in the session 1897, the whole affair may as well be hung up, pending the arrival of the Government measure. It may happen that the Council and their schemes are "not wanted." The Council have just received a snub from the Local Government Board, in the rejection of their proposal to the department that the London Water Companies should be required to frame their accounts so as to give certain details not at present shown in the statements furnished to the Council under the Act of 1871. The decision of the Local Government Board has been received with "regret;" but the Water Committee do not propose to take any further action "at the present moment." A "flash of silence," as Carlyle would say, may not be amiss.

PERSONAL.

Mr. J. S. PRIOR has been elected Chairman of the Southminster Gas Company, *vice* the late Mr. John Page.

Alderman G. WINCH will succeed the late Dr. Weekes as Director of the Brompton, Chatham, and Gillingham Water Company.

Mr. E. T. E. BESLEY, Q.C., has been elected by the Directors of the Commercial Gas Company to fill the vacancy on the Board caused by the death of Mr. F. Farnan.

Mr. W. INGHAM, the Assistant Water Engineer at Plymouth, has been appointed to the vacant position of Water-Works Engineer at Torquay. There were ninety applicants for it.

Mr. JOHN CLARK has been appointed Engineer and General Manager of the West Ham Gas Company, in succession to the late Mr. J. Thorman. Mr. Clark was the Company's Consulting Engineer; and it may be remembered that he took the control of the works on Mr. Thorman's death.

Mr. ISAAC CARR, Assoc.M.Inst.C.E., the Gas and Water Engineer of the Widnes Corporation, has received an addition of £100 per annum to his salary. Mr. Carr is the President for this year of the Manchester District Institution of Gas Engineers, and will take the chair at the annual meeting the end of this month.

In recognition of the very great services rendered by Mr. J. C. AMOS (one of the Directors) to the South Hants Water Company, it is proposed to submit a resolution, at the forthcoming meeting of shareholders, authorizing a special grant out of capital. Mr. Amos has had a wide experience as an Engineer and Director of Water Companies.

Mr. C. J. STEWART, the Senior Official Receiver under the Companies' Winding-Up Act, 1890, has been appointed Clerk to the London County Council, in succession to Mr. H. De la Hooke, who will retire next month. The candidate recommended by the General Purposes Committee of the Council was Mr. R. H. Dawe, Town Clerk of Hull; but the election of Mr. Stewart was carried by 70 votes to 54.

Mr. FRANK LIVESEY is at present staying at Antibes, for the benefit of his health; and he was consequently absent from the South Metropolitan meeting last Wednesday. We understand that there is nothing serious in Mr. Livesey's condition, but that he had not fully recovered strength after his illness of last summer when he returned to his post, and is now under the necessity of taking complete rest for a time.

On the 11th inst., at St. John's, Blackheath, the marriage of Mr. S. CUTLER, jun., eldest son of Mr. S. Cutler, of West Bank, Lewisham Hill, S.E., to Miss MARY ELLEN HILDA RICHMOND, youngest daughter of Major-General Henry Richmond, of Ashline House, Blackheath, was solemnized. After the ceremony, a reception was held at the house of the bride's father; and later in the day the bridal pair left for the Riviera. Mr. S. Cutler, jun., was admitted at the beginning of last year, as a partner, into the firm of Messrs. S. Cutler and Sons, of Millwall; and he has just returned from an extended tour through the United States and Canada, where he has been investigating the various methods of carburetted water-gas manufacture.

Southern District Association of Gas Engineers and Managers.—As briefly announced in the "JOURNAL" last week, the annual meeting of this Association will be held at the Holborn Restaurant on Thursday next. We learn from the circular issued by the Honorary Secretary (Mr. J. W. Helps, of Croydon) that the business will comprise the presentation of the Committee's report as well as one by the Sub-Committee appointed to consider the proposed amalgamation with the South-West of England District Association, and the reading of the Inaugural Address of the President (Mr. A. F. Browne, the Engineer of the Rotherhithe works of the South Metropolitan Gas Company). At the close of the business, the members and friends will dine together.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 361.)

LAST week was not a highly eventful time for the Stock Markets. It opened, however, with a great flourish; every department being extremely buoyant, and all prices going up freely, from Consols to Kaffirs. The pace, however, was too severe to last; and the upward movement received a check from realizations to secure profits. Thenceforward business settled down, and became decidedly quiet. Firmness, however, was well maintained; and at the close prices nearly all round showed an improvement. In this age of records be it noted that on Tuesday and Saturday Consols were done at 108⅞. The settlement last week was easy—there being no big account to deal with; but it was sufficient to give the Money Market a helping hand. In the Gas Market, business on the whole was a little quieter than in the preceding week; but it roused up a bit before the close. Prices are still steadily going up for undertakings located in all parts of the world. Of the Gaslight and Coke issues, the "A" was quiet, until it was quoted *ex div.*, when it became more active and buoyant. On Saturday, it changed hands at 302½—a price which is nearly equal to 309 with the dividend in it. The secured issues also showed some large improvements; and certain of them (notably "H" 7 per cent. limited) were fairly active. South Metropolitans were extremely quiet but firm; and all three issues were a shade better on *ex div.* quotation. Hardly anything was done in Commercials; but the old stock moved up a couple of points. Only two or three transactions were marked in all the Suburbans and Provincials; and these were at very choice figures, although the quotations did not advance. The Continental group also remained unchanged; and Imperial was the only one among them to show any degree of activity. In the Eastern world, Bombay and Oriental advanced; and in the west, Belgrano and Buenos Ayres. The Water Companies had another happy and rather busy week; and each one had a more or less considerable rise in value—Kent leading the way with a score of 13. This advance proceeded from the promise in the Queen's Speech of a Bill "for amending the law with respect to the supply of water to the Metropolis;" the Companies having more confidence in Parliament than in the County Council. New River was also favourably affected by the increase in the rate of the dividend.

The daily operations were: Business in Gas opened rather quiet on Monday. Prices generally were firm, while South Metropolitan "B" rose 1; Oriental, £4 10s. paid, ¼; and Belgrano, ½. Business remained limited on Tuesday; but prices still rose. Commercial old improved 2; and Buenos Ayres, ¼. Water was very active and buoyant. East London rose 4; Chelsea, Southwark "D," and West Middlesex, 3; Kent, Lambeth 7½ per cent., Southwark, and New River, 2; and Lambeth, 1. Gas continued in much the same condition on Wednesday. Bombay advanced ¼. In Water, Kent had a rise of 8. Thursday brought a little more activity into the Gas Market. Several stocks were quoted higher *ex div.*; and Buenos Ayres improved ¼. In Water, Chelsea, East London, and Grand Junction advanced 2. Friday was a busy day for Gaslights, but nothing else. Oriental, £1 paid, rose ¼. East London Water gained 3. On Saturday, Oriental again advanced. In Water, Grand Junction rose 2; and New River, 7½.

ELECTRIC LIGHTING MEMORANDA.

The Latest Electric Light Speculation—The Affairs of the Principal London Electric Lighting Companies—Monumental Bad Taste.

IT has frequently been stated in this column of late that private speculation in electric lighting is dead; and the only apparent exception to this generalization that has come into public notice really proves it. Those who know anything at all about the commercial prospects of electric lighting stations, and ever so little about the field for public lighting offered by small towns and villages in England, must have been amused by the appearance of advertisements asking for a subscription of some £77,000 to float a venture called the Town and Village Electric Light and Power Company. This Company was to exploit the Parfitt system of electric distribution—stated to be in profitable operation at a place called Kingswood—by which it is asserted that scattered and straggling districts can be lighted by electricity when other systems would fail. We know nothing whatever concerning the technical beauties of the Parfitt plan "of bifurcating the outgoing lead and cross-connecting the bifurcations at intervals," but willingly admit, on the authority of the "Electrician," that the idea may be a good one. As to whether the system is the best available for public lighting, or is better than the worst in existence, we have no means of forming an opinion. But we may be permitted to observe that this is a totally different question from that of whether there is any justification for asking the public to find £77,000 for the purpose of extending a system on the faith of the declared results of the Kingswood experiment. The best electrical journals will have nothing to do with such a

proposal. The "Electrician" remarks on the scheme that "in no case where a house-to-house supply on any of the well-tried methods is feasible, is it possible to imagine a supply on the Parfitt plan being rationally preferred; it only has advantages in the lighting of scattered districts by overhead wires. There is, it is true, an imposing number of villages to be electrically lighted. But a big field does not necessarily mean a big profit; the soil must be of a certain degree of fertility to be worth cultivating. A special company, formed for the special purpose of running a special system in a special field—and, as we hold, in a specially poor field—does not commend itself to us as containing the elements of a commercial success." After this, it would appear that the only private electric lighting speculation of modern times had better be severely left alone.

The annual reports and returns of the principal electric lighting companies are coming out; the first one of importance to hold their ordinary general meeting being the St. James's and Pall Mall Company—that "bright, particular star" of the electric lighting industry, which has figured in more prospectuses and electricians' reports to local authorities than any other concern of the kind. The Directors' report stated that it would be possible to pay a dividend of 7¼ per cent. on the ordinary shares; and that the increase of lamp connections had been 22 per cent. for the year. After much troublesome experience, the Board have learnt how to equip a power station in such a manner as not to cause a nuisance in a crowded residential neighbourhood; and this will involve the replacement of all the engines at one station by others. It is not stated what kind of engine has proved most satisfactory; but the change has necessitated the sacrifice of some £3500—not an alarming amount, after all. One of our electrical contemporaries, in commenting upon the affairs of the Company, shows that the rate of dividend has fluctuated considerably during the past five years. In 1891, it was 8½ per cent.; then it sank to 4½ per cent. in 1893; and has since recovered to the level of 1892. This is prosperity, of course, in a degree; but it is by no means a brilliant result for the best-situated electric lighting company in the world. In the technical sense, the Company must be regarded as well managed. In view of what is promised at Swansea and elsewhere as regards the saving of working expenses by the employment of rubbish destructors as sources of heat for steam raising, it is instructive to note that the cost of coal in the St. James's district of London, where every ton has to be carted through the streets and handled under the most stringent restrictions for the avoidance of nuisance, was last year 0·59d. per unit. The other most fortunate and well-managed Metropolitan Electric Lighting Company—the Westminster Electric Supply Corporation, Limited—have done particularly well. With a nearly equal increase of business, the Directors are able to recommend a dividend which will make 7 per cent. for the year; an interim dividend of 5 per cent. having been paid six months ago. Besides this, they have paid £9780 to the credit of their depreciation account, and placed £933 towards the sinking fund. The prudence with which these undeniably prosperous undertakings take care of depreciation, as soon as there is any money to spare for the purpose, should serve as a lesson to some local authorities, who are more anxious to show a profit on electric lighting than to earn a reputation for sound finance. Both the St. James's and the Westminster Companies are subject to "founders' shares," which are a trouble to them in the present, and will perhaps be a greater annoyance by-and-by. But they are unable to free themselves from the embarrassment, although the mass of the proprietors feel that it is a condition that should not continue to apply to such undertakings.

Whatever other triumphs may be claimed for the electric light as applied for indoor illumination, that of success in obtaining satisfactory embodiment as a "fitting," in an artistic sense, must be denied it. Remark has frequently been made in these columns upon the ghastly examples of bad taste in fittings displayed in the shape of "electroliers," at exhibitions and in shop windows. The worst offence of all is perpetrated by the makers of the so-called electric candles, in which a small glass bulb, carefully twisted into a spiral and mounted on a stick of white opaque glass or porcelain, is supposed to represent the honest candle-flame. And people who ought to know better, apparently buy and live with these monstrosities. Actually we saw advertized the other day a design of an "electrolier" in which three of these "candles"—the idiotic presentment of the flame, to make matters worse, being of considerably greater diameter than the mock-candle support—were grouped round an imitation of a lyre, against which was stuck, without visible means of support, crossed branches of bay; and an imitation of a ribbon was flourished over the whole creation. And this was offered as the "light of the future"!

Water Purification by Metallic Iron.—At the Society of Arts last Wednesday, Mr. F. A. Anderson, B.Sc., F.I.C., read a paper on "The Purification of Water by Means of Metallic Iron," in which he described several of the new plants erected on the lines of the original installation at Antwerp (described to the Society by the author's father nearly ten years ago), and gave some of the results obtained. The differences in the plants were mainly in details; but their erection served to show that the Anderson process is making way, and following up its initial success.

THE SECRET OF INDUSTRIAL PROSPERITY.

It will scarcely be denied by thoughtful observers of the signs of the times that British industry is now passing though a very critical stage of development. Six years ago industrial conditions began to be disturbed by the sudden and portentous rise of the movement that came to be known by the name of the New Unionism; and although the first force of this essentially insurrectionary impulse has now spent itself, it has left behind certain testamentary dispositions which have yet to be disposed of without injury to the industrial community. Prominent among these is the idea of the "living wage," which underlay the recent strike of engineers on the Clyde and Lagan, and is still in evidence in connection with the efforts now being made to keep the shipbuilding trade alive on the Thames. Close bound up with the question of the "living wage" is that of the "living profit," which is one of the gravest problems actually awaiting the consideration of Parliament in connection with the state of the national industry of agriculture. If agriculture does not pay, it is impossible for the vast army of labourers occupied in it to be maintained; and these must, therefore, abandon their accustomed employment, and seek another—thereby helping to further swell the ranks of industrial workers.

It has already been demonstrated that the power of Trade Unionism—whether of the "old" or the "new" order—is incapable of protecting the purely selfish interest of its adherents against the influence of really great and universal forces which find their ultimate bearing upon the lower strata of industrial society. The successes of Trade Unionism have always been confined to the small, local, or incidental occasions of the exercise of its power; and even these have usually proved transient. Higher wages, shorter hours of labour, recognition of the Society, or other concrete objects of Trade Union policy, have been secured in many sporadic instances; but no sooner has the Union Executive fancied its power to have become established, than its gains have perished in the gathering, through the abandonment or migration of the source of employment, the introduction of machinery, or some other uncontrollable influence. There is nothing in Trade Unionism capable of making the most highly organized trade flourish. It is a critical, not a creative force. At best, it can only help the workman to a little larger share, in the transient shape of wages, in the products of his industry, and perhaps secure for him a little more facility in earning his wages, and a little more leisure for spending them. At the worst, it can drive capital out of employment; but it can never offer it any inducement to embark in an industry.

The fundamental question of what it is that renders industry profitable, and by consequence employment whether of capital or labour possible, has been pressed home to the hard-headed followers of one of the most important of our national industries, who constitute the British Iron Trade Association, by the pressure of foreign competition. Nobody who makes, sells, or uses iron and steel needs reminding of the stringency of the conditions created for the British industry by this competition; for "Belgian," or "made in Germany" are only too familiar bye-words in this connection. Consequently, it was a laudable resolve that was taken by the Association when they determined to probe this matter to the bottom, and with this object invited representatives of employers and workmen's unions to join them in a tour of inspection and investigation through the chief Continental iron and steel producing centres. A delegation of fourteen members was finally constituted, equally divided between employers and workmen; and the result of their inquiries, as given in their published report, is a splendid testimony to the wisdom of thus associating both parties in the trade in the endeavour to ascertain the nature and strength of the dangers that appear to threaten it from without, and may have to be met by alterations in its internal economy. It is not to be wondered at, that this report has attracted earnest—we might even say, anxious—attention from many contemporary journals; for it contains much matter of absorbing interest, vouched for by unexceptionable authority, and may possibly serve as the starting-point of developments of extreme importance to the industry of this country.

It is not within our province to deal with those parts of the report which refer to the amount and quality of the output of the industrial establishments visited by the Commission, beyond remarking that the practice of these works was found to be excellent, and the use made of labour-saving and finishing machinery extensive and advantageous. The subject mainly interesting to our readers is the industrial conditions described in the report; and these appear to have greatly impressed the members of the Commission. They observed that the iron industry of Germany has grown with uniform steadiness, which is largely due to the steady character of the workmen. They express the highest admiration of the splendid discipline maintained in the works. "The workmen generally discharged their duties as if they were acting under military commands. There was no slovenliness, no undue haste, no noise, no idling about; and the foremen, in a quiet and unobtrusive manner, appeared to control everything without commotion. Each man worked as if he were a piece of machinery fitted into its proper place, which did exactly the right thing at the right moment,

because it could not do otherwise. The operations, as a rule, were carried on with the regularity of clockwork." The Commission go on to say how greatly they were struck with the spendid physique and docility of the German workmen, which they ascribe to their early military training. "But whatever its cause, its effect on the industry of the country is very important." This is a tremendous admission for such a body of inquirers. The quality of the management was also found to be admirable. "Strikes are almost unknown;" and the Commissioners testify that the relations of the managers and foremen with the workmen are most cordial, and marked by much sympathetic consideration.

The advantage of sick pay, pensions, cheap housing, and education enjoyed by the Continental workmen, both in Belgium and in Germany, are duly recognized in the report, which unfortunately suggests in this regard how much substance the British workman has thrown away for the sake of the shadow of individual liberty of action—a shadow which he has relinquished in turn for the strong fetters of Trade Unionism. How additionally senseless and suicidal such a condition of affairs as lately existed on the Clyde and in Belfast appears in the light of this information from the Continent!

It stands out from every line of the report that the German and Belgian iron and steel trade is what it is primarily because the employers are the masters, and the workmen own no divided allegiance. Moreover, the industry is based upon the recognition of the truth that, since man cannot live by bread alone, neither can faithful work be fully paid for by money wages. As the "Engineer" commenting upon this aspect of the matter points out, in England the law, and the policy of the Trade Unions, forbid such treatment of the workman as is found so successful upon the Continent. The Truck Act struck at a great abuse; but it is at least questionable whether the law did not go too far, and prevent employers from extending to their workmen advantages which would be mutually beneficial. Then comes the Trade Union, and works upon the legislative detachment of the workman from his employer, with sufficiently familiar consequences. Our contemporary sums up its commentary upon the report with the declaration that the principal advantage enjoyed by the Continental employer over employers in this country lies in "the harmony which prevails between capital and labour. That harmony is largely due to the military training of the men—foremen, managers, and masters alike—and to the remuneration of the men indirectly in the way we have indicated and the delegates have very fully explained. In this country, military service on the one hand, and indirect payment on the other, have been strenuously and successfully opposed. We must take the consequences."

By way of reinforcing the teaching of the report respecting the prime necessity of employers being sole masters of their establishments, and the value of discipline, let us turn to a picture of a very different state of things described by Mr. G. F. Pardoe, in the "Electrician," as prevailing in the colony of Victoria, where the Trade Unionist has his own way in the legislature as well as in the workshop. Our contemporary had commented sarcastically upon the equipment of the Melbourne Municipal electric lighting station; calling it "antiquated," and casting aspersions upon its efficiency. Thereupon Mr. Pardoe wrote to explain that the Victorian workman was at the bottom of the whole affair. Large units of motive power were selected, because—"owing to the high price of labour in Victoria, maintained by the Engineers' Society by the aid of a prohibitive protective customs duty—the cost of building a large engine is substantially less per horse power than a small one." Again, by Victorian laws, every engine-driver must have a certificate of competency (?) issued by an Examining Board. "It is needless to say that such a certificate is of no value whatever as a proof of competency, and is merely worked as a Trade Union dodge." The writer proceeds to give descriptions of the kind of engineering work that passes muster in the colony—safety-valves made to hold steam by hanging a "bucket of bricks" on the lever; countershafting "running with about an inch of wobble" owing to having been bent in slinging, and never straightened; and so forth. It is the old story, but must not be forgotten whenever the expediency of admitting Trade Unionism to supremacy over an industry is in question.

It is true, as the "Engineer" declares, that the indirect payment of wages and compulsory military training are not among the conditions under which British employers of labour have to maintain their position against rivals and enemies—the worst of the latter unhappily being of their own household, in the shape of the Socialistic Trade Unionists. The resources of our industrial civilization are not, however, restricted to these aids to harmony; for there are other expedients that can be made use of to unite capital and labour in friendly co-operation. We cannot prolong this article with the object of discussing this aspect of the general question, but will conclude with repeating our high appreciation of the result of the investigations of the Iron Trades Association, which cannot fail of being useful to all orders in this and other national industries. The cordiality and candour with which the Continental employers received the delegation of British technicians avowedly bent upon "spying out the land," are abundantly repaid by the testimony given by the visitors to their public spirit, industrial eminence, and wise humanity in the conduct of their affairs. Such impartial testimony cannot but be productive of good.

PETROLEUM AND ITS PRODUCTS.*

Mr. Boverton Redwood's exhaustive monograph on petroleum, shale oil, and the allied industries, is one of those standard works that, to use the familiar phrase, "no gentleman's library"—provided he is in any way interested in the subject—"should be without." What Mr. Boverton Redwood does not know about petroleum and other fuel and lighting oils, it should by this time be possible to say with truth, is not knowledge. And he has never been backward in communicating his accumulated information to the world. It was only in the issue of the "Journal" for July 16 last, that we had the pleasure of commending to the consideration of our readers the same author's observations on Petroleum in Vol. II. of Groves and Thorp's "Chemical Technology." Yet he is again to the fore with another monograph on the same subject. There is a suspicion of an *embarras de richesses* about this fertility of book-making; and although our technical readers may now admit the necessity of keeping themselves more fully acquainted with the literature of petroleum than was their wont in past times, they may very naturally be disposed to ask whether the Redwood of July really needs to be supplemented by the Redwood of December. True, it is a case of different publishers; but this is not a consideration of paramount influence with students, and certainly not with possible book-buyers. It will be our task, therefore, to aid our readers to discriminate between the Mr. Redwood who wrote on petroleum for "Groves and Thorp" and the Mr. Redwood who now comes forward with a treatise of his own.

To begin with, the scale and scheme of the two writings both differ very widely. In "Groves and Thorp," the section on the Petroleum Industry occupies, including shale oil, 146 pages; and Lamps account for 92 pages more. The present work is in two volumes; and runs, including index, to 900 pages of the same size and type. If, as most real students will agree, the merit of a text-book is largely, if not wholly, a question of the degree to which it goes into detail, this initial difference of bulk is a great consideration in favour of the later writing. Secondly, its scope is much wider. In "Groves and Thorp," the subject is treated solely from the standpoint of chemical technology; whereas here we have the observations of one technologist, accompanied by the contributions of other specialists in the same and other branches, whose names and qualifications constitute a large proportion of the author's preface. The volumes contain sections relating to the history of the petroleum industry; the geological and geographical distribution of petroleum and natural gas; the chemical and physical properties of petroleum and natural gas; the origin, production, refining, testing, transport, and storage of every description of petroleum and petroleum product, including shale oil; their uses; and, finally, a mass of information concerning statutory, municipal, and other regulations applying to, and the dues levied on these commodities in all parts of the world. It is a heavy mass of printed matter, which should obviate the necessity of publishing another book of the kind for some years to come, or until some sweeping change is wrought in the conditions or results of the petroleum industry. As the author is good enough to cite the "Journal" among the publications to which he has had recourse for information, we hope to be able to return the compliment by quoting his work whenever the occasion arises for looking up petroleum lore.

It would be difficult to conceive of a more comprehensive and explicit account than this treatise gives of the geographical and geological conditions associated with the supply of petroleum. This information has such an important bearing upon the serious practical questions of the amount and duration of the supply, that the author is abundantly justified in giving it the greatest prominence. He remarks that "as to the probable length of life of the various oil and gas fields, considerable doubt still exists; new districts being continually opened up and adding to the production, as the older-worked fields become exhausted. The history of the oil districts of the New World, where many celebrated fields are now rapidly on the wane or are totally deserted, points conclusively to the steady exhaustion of all the oil and gas strata which have yet been worked; and although the Caucasus has so far shown no signs of diminution in its yield, it cannot be supposed that the oil withdrawn is renewed (if renewed at all) at anything approaching the speed of its removal. There can be no doubt that the production of petroleum—whether of organic or mineral original—is still going on in strata where the conditions are favourable; but the oil districts which have been most largely worked, and of whose geological nature we know most, appear to have long since passed from that stage, and to be now merely reservoirs, which, when denuded of present contents, will remain barren."

There is in the first volume a vast bulk of information concerning the chemical and physical properties of petroleums and their products, and apparently "all about" well-sinking and

* "Petroleum: A Treatise on the Geographical Distribution and Geological Occurrence of Petroleum and Natural Gas; the Physical and Chemical Properties, Production, and Refining of Petroleum and Ozokerite; the Characters and Uses, Testing, Transport, and Storage of Petroleum Products; and the Legislative Enactments relating thereto; together with a Description of the Shale Oil and Allied Industries." By Boverton Redwood, F.R.S.E., &c., assisted by Geo. T. Holloway, and other contributors. Two Vols., illustrated, with maps. London: Charles Griffin & Co., Ltd. 1896.

refining plants and methods. We pass over this matter, and take up the second volume with the greater interest as it is provided with a striking frontispiece representing "petroleum-vapour flame-caps," which is distinctly fresh. We thought at the first glance that we had found some novel determinations of the illuminating power of American and Russian kerosene in a table given on p. 546, only to learn from a foot-note that "these tests were not made with the present form of this burner (Hinks's duplex), which has a higher illuminating power for a given consumption of oil." As it is, the table serves for the comparison under similar conditions of American and Russian oil, and shows that the Russian did not give as much light as the American oil, but showed much less diminution of illuminating power as the level of the oil in the reservoirs sank.

The subject of the flash-point of burning oil is fully gone into; and mineral oil lamps are discussed with a pleasing regard for modern examples. We even get a reference to the adaptation of "the principle of the incandescence gas-burner" to the burning of mineral oil, by E. Spiel, of Berlin; and the author is able to state, from experiments made in his own laboratory, that "more than double the amount of light usually yielded by a given quantity of mineral oil may thus be obtained." Upon the subject of the illuminating power of mineral oils in lamps of modern construction, the author states that, with the ordinary forms of tubular and flat-wick burners, the consumption of oil will range from 41 to over 70 grains per candle power per hour. He prefers, however, to average the rate of oil consumption at 50 grains for flat or duplex wicks, and 45 grains for argand burners. Taking the average effective illuminating power of gas burnt in dwelling-houses in the United Kingdom at 14 candles for a consumption of 5 cubic feet per hour, it is made out from the preceding data, with oil at 8d. per gallon, that gas must be sold at from 1s. 6d. to 1s. 8d. per 1000 cubic feet to be as cheap, light for light, as the oil. Many other things, however, would require to be taken into consideration, before exact comparison even of the bare cost of oil and gas lighting could be made; and even then, the factors of the taste and circumstances of the user—the most important considerations of all that go to determine his choice—would escape valuation. What about the use of oil-lamps for heating rooms, and for cooking? Are these modifications of the lighting lamp altogether unworthy of the author's notice?

Inquirers respecting "air gas" can be confidently recommended to Mr. Redwood, who has put upon record the results of many experiments on the evaporation of mineral spirit. Oil gas likewise engages his attention; but it is to be regretted that he does not sufficiently discriminate between such appliances as only exist on paper and those that really enter into the industrial equipment of the age. This is, however, a delicate question; and the author perhaps followed the most prudent course in referring his readers to our columns for further information. Finally, we must concede to Mr. Redwood the distinction of having produced a treatise which can be admitted to the rank of "indispensables"—a verdict that is rarely registered in these columns. It contains the last word that can be said at present about petroleum in any of its scientific, technical, and legal aspects.

OBITUARY.

Mr. R. DUNDERDALE, J.P., of Clifton House, Poulton-le-Fylde, has recently died at the age of 82. Along with the Birley family, he was one of the promoters of the Fylde Water Company, and held the position of Chairman of that undertaking from 1882 to 1893, when he retired through failing health.

Mr. C. RICHARDSON, M.Inst.C.E., the engineer of the Severn Tunnel, died at his residence at Clifton, near Bristol, on Monday last week, at the age of 81, as the result of paralysis. Deceased was the originator of the above-named great engineering work, which he saw to its completion, notwithstanding many obstacles. It will be in connection with this undertaking that he will be best remembered by the engineering profession. His removal calls for notice here from the fact that a few of our readers are indebted to him for an interesting experience. At the meeting of the South-West of England District Association at Bristol in 1892, under Mr. D. Irving's presidency, Mr. Richardson read a paper descriptive of the tunnel, which was visited, the day after the meeting, by about fifty members and visitors, accompanied by Mr. Richardson. Those who were present will no doubt have a keen recollection of the visit, and of the cordiality with which Mr. Richardson's courtesy was recognized at its close.

Midland Association of Gas Managers.—The nineteenth annual meeting of this Association will be held next Thursday, at the Grand Hotel, Birmingham. According to the *agenda* issued by the Honorary Secretary (Mr. C. Meiklejohn, of Rugby), the annual report and accounts will be presented; new members will be proposed for election; and Mr. W. R. Cooper, of Banbury, the President for the year, will deliver his Inaugural Address. After the meeting, the members will, by the courtesy of Messrs. Elkington and Co., visit the show-rooms and works of the firm; and later on tea will be provided.

NOTES.

The Tun as a Measure of Quantity.

The tun seems to be a rather elastic measure of quantity. Last year the Plymouth Water Committee found themselves at loggerheads with the Admiralty respecting the exact meaning which was to be attached to a section of an old Act of Parliament, under which the Plymouth Corporation are bound to supply the Admiralty with 400 tuns of water per day. The difficulty was to determine what really is a tun. According to the computation of Mr. E. Sandeman, the Corporation Water Engineer, a tun is 216 gallons; while the Admiralty insisted on their right to have 252 gallons. So important was the point considered, that it was referred to the Superintendent of the Standards Department of the Board of Trade (Mr. H. J. Chaney), who promptly decided that neither figure was exact, but that a tun really is equivalent to 210 gallons. The Water Committee felicitated themselves on the fact that this decision meant a saving of 6 million gallons of water a year; and they quite prided themselves on their success. Within the last few weeks they have, however, again had under consideration the meaning of the term. This time it was in connection with the supply of water for merchant ships calling at the port; and a resolution on the minutes of the Committee records the fact that, in future, a tun is, for this purpose, to be reckoned at 224 gallons. The point is not of great importance; but it can hardly be convenient or consistent to have in use at the same place two measures of different capacity with the same name.

Determination of the Caking Tendency of Coals.

"Glückauf" publishes a communication by Louis Campredon on the caking properties of coals and a method of determining them. The caking property of a coal is proved by a table of results to have no relation to its chemical composition; and therefore an ultimate analysis of coal does not give any clue to its caking tendencies. The determination of the amount of volatile matter permits the character of the residue to be observed, and affords some guide to the caking power. A measure of the tendency to cake may be had if a process similar to that used in cement testing is resorted to. The mixing of more or less of some indifferent substance with the coal is the basis of the proposed method of comparison. The coal is powdered to pass through a sieve of 2580 meshes per square inch, and a fixed quantity—say, 1 gramme—of it is mixed with various amounts of uniformly fine sand. Each sample of coal and sand is heated to redness in a small porcelain crucible; and the character of the residue is observed when cool. From the various samples, the maximum quantity of sand which may be added to the given weight of coal with the production of a firm cake on heating is found. The weight of coal is taken as unity in the scale of comparison; and the caking power of coal which leaves a powdery residue is, of course, *nil*. The highest result found with any coal was 17° on this scale; pitch gave 20°.

Heating, &c., by Gas and Electricity.

Herr Schäfer gives in the "Journal für Gasbeleuchtung" a comparison of the cost of cooking and heating by gas and electricity, on the basis of the current prices at Berlin. He alludes to a paper by Dr. H. Hartmann on the application of electricity to heating and cooking; and he assumes the duty stated by him to be correct. The current costs 16 pf. (1·9d.) per kilowatt-hour; and gas 10 pf. (1·2d.) per cubic metre, or 2s. 10d. per 1000 cubic feet, in Berlin. A cubic metre of the gas has a value of at least 5000 heat-units. A very ordinary gas cooking-stove utilizes about 50 per cent. of the heating value of the gas; a water-heating apparatus, at least 75 per cent.; and a heating-stove of good construction, 90 per cent. Therefore gas at the above price gives, for every 10 pf. expended, the following numbers of available heat-units: In cooking, 2500; in heating water, 3750 heat-units; and in ordinary heating, 4500 units. Electricity gives per kilowatt-hour theoretically 630 heat-units; and granting the very high efficiency of 90 per cent. for cooking, and 95 per cent. for heating water and for warming rooms, 10 pf. expended will give the following numbers of available heat-units: In cooking, 354; in heating water and for ordinary heating purposes, 374. Therefore, at the current Berlin prices, cooking by electricity is about seven times, water-heating about ten times, and warming rooms about twelve times as dear as the same operation carried out by gas. In Cologne, the ratio is even more unfavourable to electricity. To compete with gas for cooking and heating purposes, electrical current must be supplied at 2 to 3 pf. (0·24d. to 0·36d.) per kilowatt-hour, which at present is out of the question.

Dr. Hopkinson on the Theory of Light.

In the course of his Inaugural Address as President of the Institution of Electrical Engineers, Dr. John Hopkinson stated afresh Maxwell's electro-magnetic theory of light, which he qualified as one of the great generalizations of the century. As Dr. Hopkinson expressed it, the theory in question is simple enough in its character, broadly stated. Suppose we have an electrical disturbance, a transient galvanic current, in any dielectric, this disturbance (assuming the magnetic effects of currents in dielectrics, or non-conductors, to be the same as in conductors) will be propagated as a wave in directions perpendicular to that of the currents. The velocity of the wave can

be calculated from purely electrical experimental knowledge: It is 3×10^{10}, if the dielectric be a vacuum. The velocity of light is 3×10^{10}. We know nothing of what light is; but we do know that it is a wave, and that the disturbance is perpendicular to the direction of transmission of the light. What is the ultimate nature of this disturbance, we have no idea from the standpoint of the science of light. Dr. Hopkinson therefore inquires whether it is not "infinitely probable" that the waves of light are none other than the electrical waves which we know must exist, and must be propagated with the velocity of light? This theory demands no "ether," and has no reference to the fundamental nature of the phenomena involved. Dr. Hopkinson's point is that the ethereal theory of light is metaphysical, and does not concern the practical man or the physicist.

Lord Rayleigh's Latest Report on Argon.

The latest information respecting argon was communicated by Lord Rayleigh to a recent meeting of the Royal Institution, and was given briefly in the "JOURNAL" for the 21st ult. Upon the question of density, Lord Rayleigh observed that at the meeting last year he had only been able to speak of the density of the gas prepared by the magnesium method. Further investigation of argon prepared by the oxygen process (by which, after considerable difficulty, three litres of the gas were obtained) resulted in the determination of its density as 19·940, which almost exactly equalled that found by Professor Ramsay for the gas obtained by the magnesium process. This fact allows the inference that the gases obtained by the two processes are identical, and also suggests, though it does not prove, that the gas is not a mixture. It is also unfavourable to the view, supported by some eminent chemists, that argon is an allotropic form of nitrogen, since the weight of this modification should be 21. The refractive index of argon has been ascertained to be 0·96; air being taken as unity. In gas from springs at Buxton, there is some 2 per cent. of argon, with a doubtful indication of helium. The question whether there is helium in the atmosphere is an interesting one; but the experiments seem to show that there is not one part of it in 10,000 parts of air. It must nevertheless be present in a mathematical sense, since it is a product of certain springs.

Bricks and Brickwork.

Some valuable hints respecting the qualities of bricks and brickwork were given by Mr. Toomey, a representative bricklayer, at a recent meeting of the Architectural Association. The speaker divided the numerous kinds of bricks now in the market into the two classes of "sand" and "pressed" bricks; and he exhibited specimens of the different descriptions of bricks now in the market—discussing them under their technical names. In regard to *malms*, he said that these had gone out of use very much as facing bricks, owing to the competition of cheaper external facers. *Shippers* are a similar, but harder burnt brick. They were used to face the London Board Schools; and they are the most durable for the purpose in the market. *Stocks* belong to the same class. These three descriptions of bricks Mr. Toomey considered unequalled for durability and cohesion, as shown by the labour required for cutting through walls built of them. The *red sand brick* retains its colour and improves with age—the softer ones becoming harder. The *red pressed brick* has advantage in uniformity of size; but in exposed situations the surface is apt to peel, and show the rough inside. The wire-cut brick, though used for cheapness, for internal facing, is inferior to the common stock. The principal point in favour of the Fletton brick is its squareness and in some instances cheapness. Glazed bricks include many inferior kinds, with which it is impossible to make a good job. Mr. Toomey laid stress upon the necessity of well wetting bricks before laying, and grouting each course. In work that is to be pointed afterwards, the joints should be raked out 1½ inch deep, well brushed with a hard broom to clear away loose mortar, and the pointing well pressed into the work. It is preferable, however, to do without raking and pointing by properly "striking" the joints as the work proceeds, which should always be done when the wall is not to be plastered.

The Scarcity of Russian Gas Oil in the market should shortly cease, as the Transcaucasian Railway has again been made ready for traffic.

Proposed Development of an Irish Coal-Field.—It is reported that a series of boreholes have been sunk at Ballycastle, in the county of Antrim, and have disclosed a coal-field of considerable area, containing three seams of coal, respectively 23 inches, 29 inches, and 4 feet in thickness. The establishment of a small colliery is contemplated for working one of the seams for the supply of the district.

Proposed Government Measures for the Present Session.—Among the Government measures promised in the Queen's Speech at the opening of Parliament last Tuesday are Bills dealing with compensation to workmen for injuries received in the course of their ordinary employment, the avoidance and settlement of trade disputes, the regulation of public companies, the amendment and consolidation of the law relating to public health in Scotland, and the amendment of the law with respect to the supply of water to the Metropolis.

TECHNICAL RECORD.

AN ACETYLENE STANDARD FOR PHOTOMETRY.

M. Violle considers that acetylene offers certain advantages as a photometric standard. This opinion has been expressed in a communication made to the Académie des Sciences, and contained in a recent number of the "Comptes Rendus." The following is a translation thereof:—

The practical advantages of flames as standards of light have led to their almost exclusive employment for this purpose at the present day. A gas of constant chemical composition, burning under defined conditions, must admittedly form a useful accessory standard. Acetylene, the importance of which has been shown in a masterly study of it by M. Berthelot, appears to be well adapted for the purpose. M. Moissan has found the means of readily preparing the gas in a pure state by the action of water on calcium carbide, which is easily manufactured in the electric furnace. If acetylene is consumed under slight pressure in a burner which gives a broad shallow flame, the latter is quite steady, very bright, remarkably white, and, for a fairly large surface, of practically uniform luminosity. By placing in front of the flame a screen with an opening of fixed dimensions, which can be varied for particular cases, a source of light well fitted for ordinary photometrical observations is obtained.

These principles were enunciated last year at a meeting of the Société Français de Physique; and M. Charpentier (for whose valuable assistance my thanks are due) has constructed for me a standard lamp embodying them, and easily used. The acetylene, issuing from a small conical orifice, draws in the required air, and then passes through a narrow aperture into a tube in which mixing occurs. This tube ends in a steatite batswing burner, like those employed for illuminating gas. Either the whole or a clearly defined portion of the flame may be used. In the model employed, the flame is enclosed in a small chamber, one of the sides of which is provided with an iris diaphragm, enabling any desired number of candles to be secured. Another side is made to accommodate plates with previously calibrated apertures. The whole flame corresponds to more than 100 candles, under a pressure of 0·30 metre of water, and a consumption of 58 litres (2·049 cubic feet) per hour. The illuminating power of acetylene is therefore more than twenty times that of coal gas burnt in a bengel burner, which gives 1 carcel (9·6 candles) per 105 litres (3·708 cubic feet); and at least six times that of coal gas consumed in a Welsbach burner, which gives 1 carcel per 30 litres (1·059 cubic feet). Moreover, spectrophotometry shows that, for the whole length of the spectrum, from C to F, the light from acetylene differs little from that of platinum in a state of fusion. The latter is employed as the absolute unit; and it is so related to the candle that this is defined as one-twentieth of that unit. Photography, which offers the best means of studying rays of small wave-length, shows that in the flame of acetylene there is an actinic intensity which should prove of most valuable service.

DRYING AND CARBURETTING COAL GAS WITH CALCIUM CARBIDE.

A process for drying and carburetting gas by means of calcium carbide is covered by an American patent granted to Mr. T. L. Willson, who is already well known for his efforts to produce acetylene on a commercial scale. The stoppages so prevalent in gas service-pipes in winter in many parts of the Continent, due to the condensation and freezing of the aqueous vapour carried by the gas, are difficult of prevention; and the "Journal für Gasbeleuchtung" thinks that Mr. Willson's plan may prove of great service. It depends on the mutual decomposition of water and calcium carbide, with formation of lime and acetylene. It is well known that calcium carbide decomposes when exposed to the moisture of the atmosphere. Mr. Willson proposes to pass the gas on its way from the holders to the distributing system through vessels resembling purifiers, on the grids of which lumps of calcium carbide have been placed. The gas is completely freed from moisture by its passage through the carbide, and at the same time is enriched by a volume of acetylene corresponding to the amount of water removed. Therefore, however greatly the gas may be subsequently cooled, it cannot deposit water. The acetylene remains gaseous under all conditions; and consequently the enrichment by it is quite permanent.

An investigation of the process shows that it depends primarily on the quantity of water in the gas, which varies with the temperature. On calculating out the percentage by volume of acetylene added to the gas according to the amount of aqueous vapour which saturates the latter at different temperatures, it is found that it varies from 0·21 to 0·424 between 23° and 39° Fahr. Therefore the addition to the illuminating power of the gas at low temperatures is inconsiderable. But it may be made greater at will by increasing the amount of moisture in the gas. Thus, if the gas in the holder is maintained at 50° Fahr., on passing through the calcium carbide vessel it will take

up 0·6 per cent. of acetylene, which, though apparently little, would have an appreciable effect on the illuminating power. On the other hand, the moisture in the gas would be reduced to the merest traces; and a great depression of temperature would not be attended by formation of ice in the mains.

Experiments on a practical scale have not yet been made; but they would be of great interest, especially as calcium carbide is now produced in quantity at several places in Germany at a relatively low cost. The application of the process might, however, be confined to the very cold periods in winter, when the price of the carbide would not be of great moment if its use were effective in preventing the interruptions of supply caused by the formation of ice in the services.

MR. J. M. SOMERVILLE ON GAS-BURNERS.

On Wednesday last, in the hall attached to the Welsh Wesleyan Chapel, City Road, a lecture on "Gas-Burners" was delivered by Mr. J. M. SOMERVILLE, Chemist to the South Metropolitan Gas Company, before the members of the Gas Engineering Society, the formation of which was noticed in last week's "JOURNAL."

The lecture was illustrated by a number of burners. These were fixed, according to their chronological order, on a length of gas-piping, and so demonstrated the gradual progress that had been made from the punctured thimble to the Welsbach incandescent gas-light. As Mr. Somerville proceeded, the burners were shown alight; and some interesting comparisons were effected. The gas issuing from the perforated thimble was first lighted, and then that from a short tube on which was an iron cap containing a series of fine holes. The lecturer explained that Murdoch was led to adopt the latter when contemplating the lighting of the Soho Works, by the accidental capping by a thimble of the flame issuing from a gas-pipe. The first burner to come into general use consisted of three rat-tail flames; and this was commonly called the Fleur de Lys. In improving this, Murdoch arrived at a burner which was a kind of comb, possessing a number of orifices close together, but with quite distinct jets. In the course of his lecture (and it may be conveniently mentioned here), Mr. Somerville referred to Williams and Dean's burner as a curious instance of "history repeating itself" in relation to the last-mentioned burner devised by Murdoch. Williams and Dean's burner was described in the "JOURNAL" for Dec. 10 last. It is a combination arrangement; and in the steatite tip of the cap, there is a row of very fine holes, giving, of course, an unbroken flame, but the jets can be distinctly traced. The iron burner, with the thin slit, next came in for notice. Drawing attention to the section of the burner, Mr. Somerville pointed to the enlargement of the head at the orifice; remarking that the increase of material at this point allows of the retention of a portion of the heat of the flame and consequently helps, although slightly in this case, in the combustion of the gas.

The next advance was the flat-flame burner with clay or steatite tips, which readily receive and retain a very high temperature; and this was taken advantage of in Sugg's table-top burners. But these various burners must have the proper pressure supplied to them, in order to obtain their full effect with regard to consumption. This brought Mr. Somerville to the question of automatic governor burners, of which he showed Mr. Sugg's "Vincent" as a good example. Some little time was spent in illustrating the action of these governors, by the aid of a burner with a glass body.

Passing to the argand burner, the lecturer described its construction, and reference was made to its use for photometrical purposes. A noticeabe feature of the burner, said the lecturer, is the immediate and almost regular increase and decrease of the flame upon alterations in the quality of the illuminating power of the gas. There is a slight disadvantage in the form of the burner when dealing with a gas of low illuminating power, owing to the supply of air being more than is required, which results in the cooling of the flame. For instance, dealing with 15-candle gas, a flame is given somewhat less in height than with 16-candle gas with the prescribed consumption of 5 cubic feet per hour. Adjusting the flame to the height for a 16-candle gas, taking the increased consumption and working the result out proportionately, a value of 15·5 or 15·6 candles is given to the gas—this being due to the restoration of the hydrocarbons consumed to the air supply. Richer gas, giving a higher flame, has its air supply restricted, causing the tip of the flame to darken in colour, and to elongate, instead of being strictly defined. The next burner to claim brief notice was Bray's "Adjustable," by which the efficiency of that maker's ordinary burners has, it was stated, been increased 50 per cent. in some forms; in others, not quite so much.

The lecturer then turned his attention from the burners to the gas consumed. He defined flame as being matter undergoing chemical combination. Explaining this statement, he dealt, in an explicit manner, and at some length, with the constituents of coal gas. This was followed by an examination of the physical behaviour of the gas-flame. Flat flames, he said, consist, generally speaking, of four parts: (1) An outer sheath or mantle surrounding the whole flame—visible when the luminous parts are hidden, or, when a little sodium vapour is allowed to come in contact with the flame—due to the rapid and complete combustion of some of the gas; (2) an inner bright blue portion, visible at the base of the flame, due to the large quantity of air at that point; (3) the yellow and luminous part of the flame when the heat from the outer sheath and inner portion is decomposing the hydrocarbons, setting free the carbon which glows and burns; and (4) a dark inner region of unburnt gas, surrounded with the products of combustion. Mr. Somerville proceeded to explain Professor Lewes's acetylene theory; and the members were, in this connection, particularly interested in the flames produced by a sample of acetylene gas which the lecturer had provided. Having shown that the immediate formation of acetylene in flames reduces the inner bright blue portion, or, in other words, quickens the production of luminous flame, the lecturer remarked that it should therefore be produced as quickly as possible. This is to be done by increasing the temperature at the outlet of the burner; and this is what is performed by regenerative burners. This class of burner was then explained by means of one of Sugg's "Aladdin" lamps, the construction of which is very simple, but nevertheless, with a consumption of 3·76 cubic feet of gas, it affords, he believed, an illuminating power of nearly 25 candles.

Mr. Somerville passed on to the consideration of non-luminous flames, employing, as an example, a bunsen burner. The great heat of these flames, and the absence of carbon particles, is made use of in incandescent burners. The burner used with the Welsbach light he described as a very clever one, because it comes so near the explosion point; and by it, in conjunction with the mantles, a light of from 50 to 60 candles, and even higher, can be obtained. Concluding his lecture, Mr. Somerville observed that the first burner he showed was capable of giving a light of about 1 candle per cubic foot; and, passing along, this value rose to 2, 3, 8, and 15 candles per cubic foot, and, adding acetylene gas, an efficiency of nearly 50 candles is obtained. Therefore in the 100 years of gas lighting, the value of the light has been increased fifty times.

On the motion of the SECRETARY (Mr. E. D. Weippert), seconded by the CHAIRMAN (Mr. G. P. Lewis), a hearty vote of thanks was passed to Mr. Somerville.

Gas Traction is to be further extended by the construction of a line of tramway between Hirschberg, Warmbrunn, and Hermsdorf, in Prussian Silesia. A company has been formed, with a capital of £40,000, to construct and operate the line.

Naphthalene for Hop Washing.—In the "Journal of the South-Eastern Agricultural College," Mr. H. H. Cousins gives some particulars in respect of hop washing when the plants are attacked by vermin. He says he made a large series of experiments with such substances as paraffin, xanthates, sulphides, sulphocarbonates, naphthalene, &c.; and eventually he arrived at a paraffin-naphthalene emulsion which proved to be a safe and effective aphicide. When mixed with liver of sulphur, xanthate or sulphocarbonate will effectually kill red spider and most hop pests; and it also appears to be a good specific for mould. Mr. Cousins acknowledges that the use of naphthalene in hop-washes is no new thing; but he says the difficulty has been to keep it from separating and clogging the washer.

Removal of Overhead Wires in Boston (Mass.).—In accordance with the law passed by the Massachusetts Legislature of 1894 requiring the overhead electric wires, excepting the West-end trolley wires, to be put underground by their owners within four years in certain parts of Boston, two of the four districts into which the whole section was divided have been completed; and there is every prospect that the work will be done by the various companies within the time stipulated. In 1894, 2,695,800 feet of overhead wire was buried; and in 1895, some 555,000 feet of conduit-pipe was laid, into which nearly 900,000 feet of cable was drawn—affording accommodation for 11,000,000 feet of overhead wire. For the present year, the work laid out will afford accommodation for 15,000,000 feet of wires now overhead.

Presentation to Mr. S. Cutler, Jun.—On Friday, the 7th inst., a very interesting and pleasurable gathering took place in the works of Messrs. S. Cutler and Sons, at Millwall, for the purpose of giving expression to the kindly feelings of the principal employees of the firm towards Mr. S. Cutler, jun. (the eldest son of the principal), who has now become a partner, on his then approaching marriage. As a token of their good wishes, a suitable gift had been provided in the form of a handsome marble clock with appropriate ornaments. The presentation was made, in the presence of the subscribers, by Mr. Collis, who referred to the long period of thirty-five years during which he had served the firm, and to the various changes, progresses, and successes which, in company with not a few of those around him, it had been his lot to witness and assist in. He gave eloquent expression to the regard and respect which Mr. Cutler, jun., had gained among those engaged in all departments of the concern, many of whom had known him from his earliest childhood, and had seen him grow up to the position he now occupied. Mr. Cutler, jun., suitably acknowledged the gift, and referred in feeling terms to the kind things which had been said of him. A few remarks from Mr. Samuel Cutler, sen., concluded the proceedings.

GAS AND OIL ENGINES.

On Thursday, the 6th inst., Professor W. H. WATKINSON, Wh.Sch., M.Inst.M.E., commenced a course of lectures on the above subject in the Engineering Department of the Glasgow and West of Scotland Technical College. They will embrace the following and many other topics: Comparison of gas and steam engine methods; sources of loss in each case; hot-air engines, with internal and external combustion; descriptions of the principal gas and oil engines; methods of governing, igniting, or operating the valves, &c, in such engines; vaporizers for oil-engines; the production of cheap gas for fuel; relative advantages and disadvantages of gas and steam engines for the driving of large works and for electric light stations; principles of design of gas and oil engines; the testing of such engines, and the probable direction of improvements in their design and construction. During the past twelve or fifteen years, Mr. Watkinson has had considerable experience in connection with gas and oil engines, both in Sheffield and Glasgow; and in undertaking the present course, he has started on quite a "new departure," as no systematic lectures on this subject have ever been given by any engineering professor in Scotland before. The chair was occupied by Mr. W. Lorimer, one of the Governors of the College; and there was a very large attendance of intending students.

The CHAIRMAN having made some appropriate introductory remarks,

Professor WATKINSON proceeded to deliver his first lecture. He said that when the "Otto" gas-engine was introduced to the notice of power users some twenty years ago, it was found that for small powers a really successful competitor of the steam-engine had at last been invented; and year by year within that period, it had continued to push out larger and larger steam-engines. There were now in actual use gas-engines of 100, 200, 300, and up to 450 horse power each, having only one cylinder; and they had displaced, or were displacing, steam-engines, and doing the same work much more cheaply and efficiently. There was also projected, if not in course of construction, at Rouen, a gas-engine of the "Simplex" type, working with two cylinders, which was to have a capacity of 1000-horse power. In England, the manufacture of gas-engines had grown into an industry of great importance, especially since the life of the "Otto" patents had run out. But in Scotland, until a comparatively recent period, the only workers of note in this branch of engineering were Messrs. Dick, Kerr, and Co., of Kilmarnock, and Messrs. Peter Burt and Co., of Glasgow. The last-named firm had two of their engines in hand, each of 150-horse power indicated, to the order of Mr. Stelfox, for the Belfast Corporation electric lighting station. In the course of the lectures he was commencing, he intended to describe the action of the principal types of gas and oil engines; to point out the advantages of gas-engines for driving large works; and to show how to make all the important calculations necessary in designing and testing both kinds of engines. He hoped to be able to demonstrate how it might be possible to construct gas-engines having an efficiency of 45, and perhaps even of 60 per cent. and upwards. [At this stage, the lecturer showed a number of wall diagrams and lantern-slide views of steam and gas engines, in order to illustrate the fact that all such engines are simply machines for converting heat-energy into work.] Engines of the various kinds referred to all acted by changes in fluid pressure due to alterations in the temperature of the fluid-link; and the method of operation might in the different cases be shown by a series of very simple diagrams. The lecturer subsequently spoke of the steam-engine, which he said he regarded as a wonderfully perfect machine, and which did not, in his opinion, seem to be capable of much further improvement. Unfortunately, it was an exceedingly poor transformer of heat into work. Even in the largest and best steam-engines in existence, the combined efficiency of the engine and boiler was only about 12 per cent.; and at present engineers did not know of any means whereby they could be enabled to increase it to 20 per cent. In the majority of cases, the combined efficiency of engine and boiler did not exceed 5 per cent.—that was to say, 95 per cent. of all the coal burned in the boiler-furnaces was hopelessly wasted. As a clear understanding of the causes of loss in a steam-engine plant would be of great assistance in connection with the improvement of the gas-engine, and especially in teaching his audience what to avoid, Professor Watkinson spent a few minutes in indicating where the inevitable losses occur in steam-engines. In addition to the great and unavoidable losses which he pointed out by means of his diagrams, he said they had the heat carried up the chimney in the products of combustion, and there were the losses which were due to initial condensation in the cylinders of the steam-engine. The two kinds of losses last referred to might be greatly reduced—the former by feed water or air-heating, and the latter by compounding—and even annihilated by superheating the steam. After briefly describing the three principal types of gas-engines, Professor Watkinson concluded his introductory lecture.

Subsequently, an adjournment was made to the engineering laboratory in the basement floor, where a Kilmarnock gas-engine was shown at work, and its various parts were described by the lecturer.

Professor WATKINSON delivered his second lecture last Thursday. He again briefly described the action which takes place in the cylinder of the gas-engine, and then proceeded to say that many engineers still retain the notion that the explosion in the cylinder is of an almost instantaneous nature, and is followed by an exceedingly rapid fall in pressure. He wished to emphasize the fact that all gas and oil engines are hot-air engines, with the furnace inside instead of outside the cylinder. Such engines, therefore, were best described as internal combustion hot-air engines. In spite of chemical changes occurring during combustion, the volume and pressure of the products were the same within 2 per cent. of what they would be if air only were the working agent, and undergoing the same changes in temperature. After pointing out that in good average gas-engines 23 per cent. of the heat is converted into work, 39 per cent. carried away by the cooling water, and 38 per cent. by the exhaust, he stated that, while the first item remains practically constant, the other two vary greatly in different engines; the sum of the two, however, keeping approximately constant. This would, he said, be the case so long as the "Otto" cycle was retained. Any means which reduced the amount of heat lost to the cooling water simply caused the heat discharged in the exhaust gases to be increased by the same amount. This difficulty could be overcome by greater expansion of the gases. The lecturer then explained in detail how heat is communicated to the cylinder walls during expansion; stating that, though a considerable amount is undoubtedly lost by actual contact of the gases with the walls—that quantity being much increased by the convection current set up during combustion—by far the greatest loss is due to the direct radiation of heat from the whole of the white-hot flame in the cylinder to its cool walls. He also pointed out several means whereby such losses as those to the exhaust might be reduced. In order to illustrate this part of his subject, he referred to a series of curves which he had had plotted, showing the range of pressure necessary in order to get an engine which would work without a water-jacket, and in which the loss to the exhaust would be reduced to a minimum. Professor Watkinson subsequently discussed the effect of piston speed on the efficiency of an engine; illustrating his remarks by reference to results of tests of engines of various types. In dealing with the different parts of the subject of the lecture, he referred to the engines invented by Mr. Foulis, of Glasgow, Mr. Atkinson, Mr. Burt (the "Acme"), and Mr. Root. He then gave a number of the equations necessary in the design of engines of this type; leaving over till a subsequent lecture the application of them.

The Acoustic Analysis of Mixtures of Two Gases of Different Densities.—Mr. E. Hardy has been experimenting with mixtures of two gases of different densities, with the view of ascertaining their acoustic properties; and the results are recorded in a recent number of the "Comptes Rendus." With mixtures of coal gas and air, the author obtained two or three beats in 20 seconds with 1·100oth part of gas; about six beats in the same time with 2·100oth parts; and ten times as many beats with 20·100oth parts.

Marsh Gas under Ice.—Professor Ira Remsen describes in "Science" an interesting case of the accumulation of marsh gas under ice. It appears that a number of skaters were on a large artificial lake upon which remarkably clear ice had formed. In various places, white spots were noticed in the ice, suggesting air-bubbles. Someone bored a hole through one of these white places, and applied a flame; and the escaping gas took fire. This led to further experiments; and it was found that, by boring a small hole, a long thin jet of flame could be obtained. The gas was marsh gas, formed by the decomposition of the vegetable matter at the bottom of the lake.

Received.—"Chemistry for Engineers and Manufacturers." A Practical Text-Book. By Bertram Blount, F.I.C., F.C.S., and A. G. Bloxam, F.I.C., F.C.S. With illustrations. Vol. I., dealing with the Chemistry of Engineering, Building, and Metallurgy. (London: Charles Griffin and Co., Limited.)——"'The Electrician' Electrical Trades Directory and Handbook for 1896." (London: "The Electrician" Printing and Publishing Company, Limited.) This Directory, which is just published, contains, in addition to the special features which have been associated with the book for many years, a number of fresh items. The large sheet table, giving statistical particulars of the electric supply stations throughout the country, has been brought up to date; and it is supplemented by a coloured map, showing the positions of the stations and the system of distribution adopted.

Petroleum in Russia.—Herr H. H. Niedenführ, writing in the "Chemiker Zeitung," describes some extensive oil-fields to the north of the Caucasian Mountains, and bordering on the Kuban River. They lie to the north of the town of Anapa on the Black Sea, and extend inland to Maikop. In some places the petroleum appears at the surface; but generally it is only discovered by boring. The specific gravity of the oil varies considerably, according to the nature of the soil. Where the latter is very porous, the lighter fractions have been able to escape, and the oil is heavy. There are a few inconsiderable refineries on the Novorossisk Railway; and some crude oil is used for lubricating purposes. But, notwithstanding the facilities for shipment afforded by the rivers of the district, and the ports on the Black Sea, the oil is won in very primitive fashion, and at present many fields are very little worked.

RÖNTGEN'S RADIATIONS.

The remarkable radiation effects observed by Professor Röntgen, and recorded in a "Note" in the "JOURNAL" for the 21st ult., have been much discussed in the general and technical press during the past fortnight. As soon as the telegraphic announcements of Professor Röntgen's experiments reached this country, Mr. A. A. C. Swinton set to work to repeat them, with a considerable degree of success. His photograph of his own hand, showing all the principal bones surrounded by a halo indicating the flesh, has been reproduced in "Nature" and other periodicals, from which the following observations upon the new effects are collated. In the first place, Mr. Swinton remarks that the Röntgen discovery is not entirely novel, inasmuch as the existence of what have been called the "cathode rays" has been recognized for some years; and about two years ago Lenard, using a tube with an aluminium window, through which these rays passed with ease, obtained photographic shadow images almost identical with those of Röntgen, through pieces of cardboard and aluminium interposed between the window and the photographic plate. What Röntgen has done is to show that this aluminium window is unnecessary, as some portion of the radiation accompanies the cathode rays, and is photographically active, and will pass through the glass wall of the tube. Further, he has extended Lenard's results in a manner that has impressed the popular imagination; and, more important still, he has brought out the curious fact that bone is so much less transparent to these radiations than flesh and muscle that, if a living human hand is interposed between a Crookes tube, in which they are excited, and a photographic plate, a shadow photograph can be obtained which shows distinctly all the outlines and joints of the bones.

The last observation must be carefully apprehended by all who desire to understand the nature of the Röntgen effect. This is not a projection of rays by means of a lens, but is purely a shadow phenomenon, due to the action on a sensitive plate of radiations which are able to pass freely through many substances that are opaque to light, while glass is exceedingly opaque to them. Indeed, Mr. Swinton's sharpest shadow photographs were obtained when a thin plate of vulcanite was interposed between the object and the tube which generated the rays. As tending to support the view that the radiations are more akin to ultra-violet than to infra-red light, it is found that a solution of alum in water is distinctly more transparent to them than a solution of iodine in bisulphide of carbon.

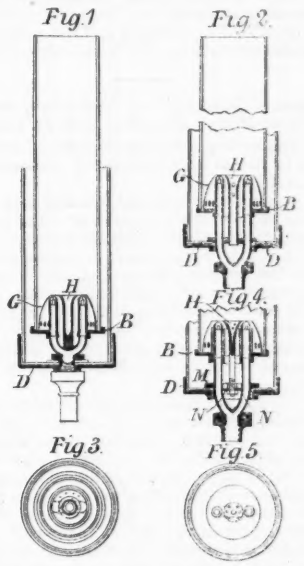
According to Röntgen himself, when a discharge from a large induction coil is passed through a Hittorf vacuum tube, or through a well-exhausted Crookes or Lenard tube, covered with a shield of black paper, a piece of paper coated with barium platino-cyanide will light up with brilliant fluorescence when brought into the vicinity of the tube. This effect will be produced even through the thickness of a book of a thousand pages, a couple of packs of playing-cards, a sheet of tin-foil, or a deal plank. The radiations which are instrumental in so penetrating solid and other substances, without reference to their opacity to light, are distinguished by Röntgen as "X-rays"—meaning that he does not know their true nature. The density of bodies appears to be the property that most regularly affects their permeability, but not exclusively so. It has not been ascertained whether the X-rays give rise to any calorific effects. The retina of the eye is quite insensitive to them; for the eye placed close to the apparatus sees nothing. Lenses, whether of glass or of ebonite, have no effect upon these rays, which also appear to be incapable of regular reflection. Lenard has shown that the cathode rays belong to the ether, and are capable of passing through all bodies; and Röntgen says the same of these rays, which are however different, as is shown by their behaviour in a magnetic field. The deviation of cathode rays by the magnet is one of their peculiar characteristics. But the X-rays are not deviated in the strongest magnetic fields; nor do they show interference effects. What, then, are these rays? Röntgen admits that their power of exciting fluorescence and chemical action would indicate their being due to ultra-violet light. But there is a weighty set of considerations in opposition to this view; the chief being that they do not operate at all like light of any degree of refrangibility, in being non-refracting, non-reflective, incapable of polarization, and absorbable by bodies in proportion to their density. Röntgen suggests that they may be ascribed to longitudinal vibrations of the ether, such as have long been imagined to exist in company with the transverse vibrations that go to account for the phenomena of light.

Professor Arthur Schuster has written to "Nature" to express his satisfaction at the discovery that the novel rays are distinct from cathode rays; but he does not argue in favour of any particular theory of them, nor against the suggestion that we have at last found the missing longitudinal wave of the ether. Professor Bottomley refers readers of the same publication to some speculations of Lord Kelvin's, given in his Baltimore Lectures of 1884, as to the possible existence of "condensional wave" in the ether, which would be waves of electricity, and would be propagated enormously faster than ordinary light waves—presumably with the consequence of being able to penetrate solid matter.

REGISTER OF PATENTS.

Regenerative Argand Gas-Burner.—Rowan, Thomas, of Hackney. No. 1067; Jan. 16, 1895.

This invention relates to burners of the argand type, whereby heated air is supplied for the combustion of the gas, by utilizing the heat of the burning gas, so as to effect the definite adjustment of the hot air supply to the consumption of gas.



After a long series of experiments, the patentee claims to have found that the efficiency of gas as an illuminating agent when burnt in a regenerative argand burner, depends upon the temperature of the air mixed with the gas to produce combustion, and the volume of heated air that is allowed to pass through the device. Further, that the gas itself should be kept sufficiently cool before ignition to prevent the decomposition of the hydrocarbon before ignition, and the too rapid combustion of the carbon during burning. He finds it also absolutely necessary that the gas pressure at the burner orifice should be kept as nearly constant as possible. His invention therefore consists in "the construction and arrangement of parts of an argand burner of definite relative proportion to one another, according to the quality or quantity of gas used." He arranges upon the burner a gallery B carrying an inner chimney, and a second gallery D carrying an outer chimney, so that an annular space exists between the two chimneys, and communicates with air-passages around and within the burner. The bottom of the gallery D is closed by a mica or other diaphragm. Around the burner is arranged a cone G, of such a shape as to cause the current of heated air to intermix with the issuing gas. A central tube spreader H is also used, having a similar object with regard to the inside surface of the flame. In this way, there is fed directly to the flame "such an amount of heated air as will produce a very high incandescent effect upon the carbon particles of the flame. Too little air would produce a smoky flame, and too much air would cause the carbon to be consumed too readily to allow of its being in an incandescent state sufficiently long to produce a flame of high luminosity."

With an ordinary argand burner with a ring of 1 inch diameter, the patentee says he obtains the highest luminous efficiency when the inner chimney is 2 inches outside diameter and 9 inches long, and the outer chimney is 2½ inches inside diameter and 6 inches long. The top of the outer chimney is arranged 4 inches below the top of the inner chimney. The area of the air-channels through the centre and up the cone G for the supply of air to the flame is 0·8 square inch; and the area of the line of holes at the base of the cone is 0·366 square inch—making altogether 1·166 square inches. A burner made in accordance with these particulars will, when burning 16-candle gas, give an efficiency of 4·25-candle power per foot per hour—or the equivalent of 21·25 candles.

The arrangements of the pipes or channels by which the gas is led to the burner, within the hot-air space, is such that the gas travelling through them at a considerable velocity does not become very highly heated; further, the temperature of the burner is kept low by the transmission of heat from the burner by conduction down the pipes into the fitting that supports the burner. When desirable, non-conducting packing may be arranged upon the outside or inside of the burner, or upon both when necessary (as shown in fig. 4), to prevent the absorption of heat by the burner from the heated air.

Fig. 4 is a modification of the burner, whereby the lighting efficiency is said to be further increased. This modification consists in the provision of means whereby a current of cold air is led up around the gas-supply channels, so as to extract the heat therefrom, and then passes on to mix with the gas to support combustion. The central spreader H is mounted on to the supporting boss M; and air-orifices N are arranged through the boss, so that the air passes up to the central air-passages, from which it issues and mixes with the flame. There may be an adjustable shutter to these orifices, to regulate the amount of cold air admitted to the burner. By this means, a current of slightly heated air is fed to the interior of the flame, so that the carbon is made highly incandescent, and is not consumed too quickly. The type of burner here described "gives an efficiency of 5 candles per cubic foot of gas burnt."

In the burner shown in fig. 2, the central air-inlet is formed by an

open-ended central tube, which feeds air only slightly heated to the interior of the flame—having, it is claimed, the same effect in producing a flame of high incandescence, as the means which have been already described.

The proportions of chimney and air-ways that are found, "by exhaustive experiment, to give a volume of air at a high temperature to maintain the carbon particles of the flame in a high state of incandescence through a considerable interval of time, and at the same time to ensure their ultimate combustion, would, if altered in proportionate effect relatively to one another, reduce the efficiency of the burner. If the gas were allowed to be heated to a high temperature as well as the air, it would be expanded in volume; and the carbon particles would readily combine with the oxygen, and be quickly consumed."

Gas Motor Engine.—Warner, R., of Chelmsford, and Rackham, R., of Walton-on-the-Naze. No. 3783; Feb. 21, 1895.

This invention relates to gas-engines capable of making an explosion every revolution, in lieu of only once every two revolutions, as most gas-engines are arranged to do.

The engine is composed of a motor cylinder and an air-pump and a gas-pump, worked by a crank eccentric, or other convenient means, from the main-shaft of the engine. The gas-pump cylinder is of smaller diameter than that of the air-pump, and is formed as a continuation of it—the plunger of the gas-pump being similarly a continuation of the piston of the air-pump. In order to clear the motor cylinder of residual gases at the end of each outward stroke of its plunger, an outlet-port is provided in the side of the cylinder. So soon as, by the outward movement of the plunger, this port is uncovered, air, under light pressure, is made to enter the end of the cylinder and sweep the residual gases out through the port.

This is effected by admitting air through an inlet-valve to the end of the air-pump cylinder nearest to the crank-shaft on the in-stroke of the piston, and discharging it on the out-stroke through an outlet-valve, into a pipe or passage leading to a valve at the end of the motor cylinder, of sufficient capacity to receive the contents of the air-pump without the air pressure therein rising beyond a few pounds per square inch. As soon as the power piston at the end of its outward stroke uncovers the exhaust-port in the side of the power cylinder, and the pressure in the cylinder is thereby removed, the valve at the end of the cylinder opens and admits the slightly compressed air into the cylinder, so as to flush out the residual gases remaining from the last explosion, and fill the cylinder with nearly pure air at about atmospheric pressure. About the time the power piston, on its return stroke, again re-covers the exhaust-port, a suitable charge of air and gas are separately discharged into the motor cylinder, and are compressed as the piston returns, and ignited at about the end of the stroke, either by a hot tube or any other well-known means.

The admission of the charge of gas and air to the motor cylinder is made through an inlet-valve with concentric openings in the seating; gas entering through one opening, and air through the other. In this way, the gas and air entering the power cylinder in closely adjacent thin sheets become thoroughly admixed, and are further mixed with the air remaining in the cylinder—viz., the latter portion of the flushing charge; and this forms the proper explosive charge. As no mixing of the gas and air occurs before entering the power cylinder, no explosion can take place outside it. The quantity of air to be admixed with the gas as it enters the motor cylinder is admitted through a valve to the rear end of the air-pump cylinder, as the piston of this cylinder makes its outward stroke; and it is delivered on the inward stroke to a passage leading to the back of the valve at the end of the motor cylinder, which thus serves as an outlet-valve.

To allow of the amount of air discharged into the motor cylinder with the gas being regulated, an opening is made in the side of the air-pump cylinder at a short distance from its inner end; so that, on the in-stroke of the piston of this cylinder, the air escapes until the opening is covered, and thereby reduces the quantity discharged into the motor cylinder. The opening may, however, be made to lead into a small vessel or container, into which the air may escape instead of into the open air. By varying the capacity of this container, more or less air may be discharged into the motor cylinder.

Gas is admitted to the rear end of the gas-pump cylinder through a valve, as the plunger makes its out-stroke. During the greater part of the in-stroke, the gas is compressed; and the plunger has a passage formed from its inner end to a small port at its side. When this port comes over an opening in the side of the cylinder leading to the double-seated valve already mentioned, gas passes the valve, and enters the motor cylinder at the proper time.

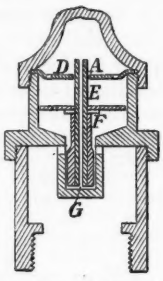
The speed of the engine is regulated by a sliding tubular cut-off gas-supply valve, actuated by the governor. This valve may have a groove cut around it, and holes passing from the groove to the interior of the valve, to allow sufficient gas to pass to give an explosion sufficiently powerful to run the engine at its normal speed with a light load; while other holes may be pierced through the valve at different positions beyond the groove, so that when the valve is shifted endwise by the governor to the limit of its stroke, a full charge is admitted—suitable for giving the explosion that is considered the best to adopt as that of maximum power. In this way, the engine can be worked from a light to a full load by the amount of gas admitted by the governor to the gas-pump.

Fittings for Water-Gas Carburettors.—Cutler, S., of Millwall, E. No. 4505; March 2, 1895.

The patentee, in his specification (which is not illustrated) of this invention, says: "This invention relates to the internal fittings of water-gas carburettors, in which a large area of heated refractory and non-porous surface is required to effect the vaporization of the oil sprayed upon such surfaces in the process of carburetting water gas. According to my invention, I place rolled, pressed, or cast steel bars of square, rectangular, oval, triangular, or corrugated section in tiers within the carburettor; each tier being placed angularly to those above and below it. In this manner, I secure a very durable series of heating-surfaces, suitable for effectively vaporizing the oil."

Gas Pressure-Regulators.—Fletcher, W. F., of New Oscott, near Birmingham. No. 4914; May 8, 1895.

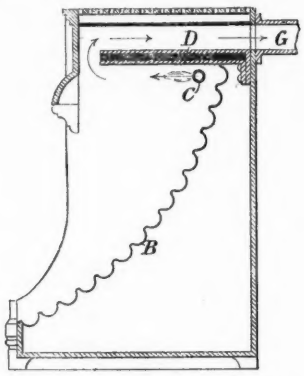
This is a modification of the gas-burner regulator described in patent No. 3474 of 1889.



A hollow guiding pin or tube E, through the valve F, is used for regulating the pressure of the gas, so as to allow a passage G to the base of the valve, down which regulated gas is passed for equalizing the pressure in the regulator. The pin E fits nicely in a hole A in the centre of the disc D, and is used for guiding purposes. About half-way between the centre and the outer edge of the disc, four holes are pierced, to allow the governed gas to pass away to the outlet, to be consumed. Thus, the guiding-pin E working in the hole in the centre of the disc obtains an additional guide, and so prevents the valve rocking from side to side in the cylinder when in action.

Reflector Gas-Stoves.—Fletcher, T., and Russell, W., of Warrington. No. 16,178; Aug. 29, 1895.

The patentees propose to employ a metallic deflector-plate next to the gas-jets, and above it a good non-conductor of heat—a fire-brick tile, or the like.



In the illustration, the stove casing contains the reflector B and a gas-burner C, above which is arranged the deflector-plate D, so formed as to be a poor conductor of heat. In the form shown, the deflector consists of two metallic plates, having interposed between them a layer of heat insulating material—such as asbestos. The composite plate is secured to the stove casing, so that the products of combustion from the burner pass under and over it on their way to the flue G.

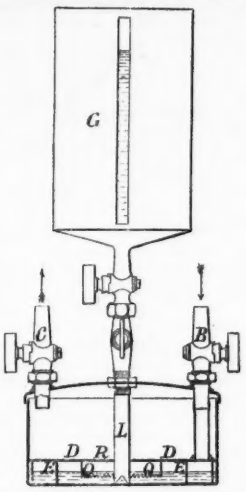
In a modified form, the deflector may consist of a metallic plate, combined with and above which is a fire-brick tile or the like. Or the deflector may be made as a shallow box enclosing air, which acts as a heat non-conductor; or other non-conductors may be similarly employed in combination with metallic plates, in order to prevent the dissipation of the heat communicated to them.

Enriching Gas.—Ewing, W., of Hamilton, and Meikle, J., of Glasgow. No. 19,916; Oct. 23, 1895.

This invention has for its object the enriching of illuminating gas "in houses, works, or other buildings where the gas is to be consumed; provision being made for safely renewing the supplies of enriching material."

The carburettor is a vessel which has fixed to it a gas-inlet tap B, and a gas-outlet tap C. Within it is formed a lower compartment by a disc or diaphragm D, which has fixed to its underside vertical partitions E, forming a circuitous passage. A pipe connects the inlet-tap with the space under the diaphragm; and the entering gas has to go through the circuitous passage formed by the partitions E. The enriching material (benzene or other volatile hydrocarbon) is contained in a vessel G, having a neck fitted with a tap or valve, and adapted for being connected to a tap fixed at the upper end of a pipe L, which extends down through the top of the vessel, and through the diaphragm. When connected as shown, the vessel G serves, like a bird-fountain, to maintain the benzene at a uniform level in the bottom compartment of the vessel; the bottom of the pipe L being formed with a notch, to allow bubbles of gas to ascend into the vessel and the benzene to descend as required. The pipe L is made adjustable by a screw-thread formed on it to receive nuts. When the benzene in G is exhausted, the taps are to be closed; and then it can be detached by loosening the screw-coupling nut. A central part of the space surrounding the dipping-pipe L under the diaphragm D is enclosed by a circular partition Q, which does not extend down to the bottom of the vessel, but dips just below the level of the benzene—its lower edge being serrated. An opening R is formed through the diaphragm, within the space enclosed by the partition; and the gas, to reach the opening R, and thence pass to the outlet-tap, has to flow under the partition, and in doing so has to pass through a slight depth

of the benzene. This arrangement "ensures the taking up by the gas of an effectual proportion of hydrocarbon, and of its absorbing some



of the less volatile constituents when the hydrocarbon is a mixture comprising portions of different volatilities."

APPLICATIONS FOR LETTERS PATENT.

1862.—GRIFFIN, S., "Starting hydrocarbon oil and other gas-engines." Jan. 27.

1866.—BERRY, G. E., "Berry's fumeless gas-iron gas and air mixer and exhauster." Jan. 27.

1900.—HOLDEN, J. J., and BAUM, H., "Manufacture of cyanides." Jan. 27.

1958.—ARMSTRONG, J. T., and BRAUNERHJELM, C. G. G., "Electric gas lighters and extinguishers." Jan. 28.

1993.—GREENE, T. A., "Automatic apparatus to be applied to wet or dry gas-meters for the purpose of prepaying the quantity of gas to be supplied." Jan. 28.

2000.—KORTWICH, C., "Glow bodies for incandescent gas lighting." Jan. 28.

2033.—WHEATLEY, W. H., "Incandescent gas-burners." A communication from T. Verstraeten. Jan. 28.

2034.—THOMPSON, W. P., "Burner for spirit or vapour lamps." A communication from the Continental Gas Glühlicht-Actien-Gesellschaft "Meteor," vormals Kroll, Berger, and Co. Jan. 28.

2075.—ARCULUS, J. W. G. N. & E. A., "Incandescent gas-burners." Jan. 29.

2096.—GILL, J., "Rotary motive-power engines, rotary pumps, air or gas compressors, and meters." Jan. 29.

2115.—TURNOR, H. T., and WATKINS, J., "Effecting repairs to fractured pipes, tubes, rods, or the like, and joining up tubes, rods, &c." Jan. 29.

2127.—BOULT, A. J., "Gas-burners." A communication from the Continental Gas-Glühlicht-Actien-Gesellschaft "Meteor," vormals Kroll, Berger, and Co. Jan. 29.

2156.—ASCHNER, F. H., "Gasifying petroleum and analogous liquids, and utilizing them for lighting and heating purposes." Jan. 30.

2183.—GLASGOW, A. G., "Utilizing the heat of newly manufactured gas for heating boiler feed-water." Jan. 30.

2269.—MOELLER, J., "Incandescent gas-lamps." Jan. 31.

2298.—LEA, J. W., and PERRINS, J. H., "Incandescent gas-lamps." Jan. 31.

2328.—BRUCE, J. B., "Hanging lamps for gas, oil, or electric light." Feb. 1.

2332.—HOLDSWORTH, G., and WILKINSON, G. S., "Generating acetylene gas." Feb. 1.

2387.—KIRBY, C., "Gas-heated hand irons." Feb. 3.

2452.—LEHMANN, J., "Burners for incandescent gas lighting." Feb. 3.

2562.—KELLET, T. W., "Chandeliers or brackets to be used with incandescent gas-lights or any other light where vibration is required to be absorbed or reduced." Feb. 4.

2644.—HALLETT, A., "Gas-governors." Feb. 5.

2661.—LANDI, T., "Materials for producing incandescent lighting when used in conjunction with the combustion of gas or inflammable vapours." Feb. 5.

2710.—SKELTON, T. A., "Improved locking apparatus for gas-taps." Feb. 6.

2753.—BAMFORD, F., and WADSWORTH, W., "Gas-engines." Feb. 6.

2910.—ERNST, E., "Gas-burners for heating and lighting purposes." Feb. 8.

2915.—CZARNIKOW, A., "Electric gas igniting and extinguishing apparatus." Feb. 8.

2929.—WIGHAM, J. R., "A method of applying acetylene gas as an illuminant for lighthouses, beacons, buoys, and other places, and for enriching ordinary gas." Feb. 8.

The Laindon Gas and Water Order.—The Essex County Council have decided not to assent to the application intended to be made for the above-named Order, on the ground that they have not been informed as to who are the promoters, whether or not the capital has been subscribed, or how it is to be obtained. The Billericay District Council, on the other hand, have resolved to give their consent to the Order, on condition that their rights under all Acts of Parliament are reserved.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Gaslight and Coke Company and the South Metropolitan Gas Company and their Coke.

SIR,—I am he described in your leader of Feb. 11, as "the mysterious cement maker." Mr. Livesey is unjust. He writes to you that my object in dealing with him for coke in the year 1894-5 was in order to injure others. My object was much simpler; and with your permission, I am going to explain it to you. I am much mistaken in Mr. Livesey (with whom I and my firm of Knight, Bevan, and Sturge have always, personally, been on the best of terms), if, after reading this, he does not consider it his duty to apologise to me.

On June 14, 1893, Mr. Frank Livesey wrote us that we were getting ahead with our contract; and, anticipating they would be rather short of coke for three months, gave us notice they could not, further than contracted, continue to supply us during that time. He added: "I shall, of course, be very pleased to treat with you for your supply after, say, the 1st of October next."

On Sept. 14, my firm wrote asking him kindly to make us a price for 12,000 tons of coke, to be taken over the twelve months from Oct. 1893, to Oct. 1, 1894. On Sept. 20, 1893, Mr. Frank Livesey wrote: "I am sorry to say I am not in a position to offer you any coke for delivery over the ensuing twelve months, as I have already concluded all our contracts for that period."

On Sept. 21, we expressed our surprise; stating that we had quite intended and expected to deal, and quite thought we should have had the opportunity, and had read his letter of June 14 in that sense.

On Sept. 22, 1893, Mr. Frank Livesey wrote stating he saw his letter of June 14 was capable of the interpretation we had put on it; but that was not the meaning he had intended to convey.

On May 10, 1894, I—being personally acquainted, and on very friendly terms with Mr. George Livesey—thought I could conveniently address him direct; and on May 14, Mr. Livesey replied that he would take care that we should have ample notice and full opportunity, and that he would put my letter in his brother's hands.

On May 23, Mr. Frank Livesey wrote me that his brother had handed him my letter of the 10th inst., that it was very early at present, and as things then appeared it did not seem probable they would have much coke to offer us; but if we would write him again in about two months' time, he would then be able to say definitely if they had any to offer us.

On May 24, we wrote Mr. Frank Livesey that we were sure we could not read his letter as meaning that he could deal more agreeably or with greater security with others.

On May 25, Mr. Frank Livesey wrote Knight, Bevan, and Sturge that he was sorry to think the idea should have occurred to them that he wished to exclude them from their list of contractors.

On June 6, 1894, I, "the mysterious cement maker," being about to go to the Engadine for three months, went to Old Kent Road, and had an interview with Mr. George Livesey—having in my mind, he says, thoughts of injury to others, but I say other thoughts. I asked him to sell me coke, for delivery from Oct. 1, 1894, to Oct. 1, 1895; and I told him I wanted to have it off my mind before I left England. I said I would give him 11s. 6d. per ton (which I thought a very high price for 25,000 tons), and would take two-thirds spread over winter months, and one-third over summer months. He hummed, and was not clear that the price would be sufficient. I offered 11s. 9d., with the same result. I knew what I was going to do; I made a plunge. I said: "Well, I will give you 12s. 6d., only give me a contract." He replied: "That is very tempting; I will bring your offer before the Board." My firm received a communication from the South Metropolitan Gas Company, accepting for 20,000 tons, but not for 25,000 tons.

At or about the same date, I went to our friends of Horseferry Road. I saw Colonel Makins and Mr. J. W. Field. I told them I was going to the Engadine, and that I desired to deal for the period from Oct. 1, 1894, to Oct. 1, 1895.

I would buy 60,000 tons, to be taken two-thirds in winter months, and one-third in summer months. We had a contract with them then running at 11s. per ton; and I certainly hoped to continue at that price. But they would not hear of it, and told me that they saw their way to an important advance. I tried all I could, step by step, and stood firm at 13s. But their firmness outlasted mine; and they intimated that any idea under 13s. 6d. would be out of the question. Then they did not know that they could let me have so large a quantity as 60,000 tons, but would look into it. The result was that a contract was worked out by correspondence for 50,000 tons at 13s. 6d. They could not see their way to sell 60,000 tons, even at that price!

But why did "the mysterious cement maker" consent to give 12s. 6d. and 13s. 6d. per ton respectively for coke that was worth nothing approaching these figures? Because life in coke had long been a misery and a danger; and the largest and most solid manufacturer did not know whether he would have coke granted him at all, or his works and engagements for the delivery of cement come to a stop. I am the freeholder of the chief part of manufacturing Northfleet, and of the largest portion of the parish of Swanscombe. There are many thousands of lives depending directly and indirectly on me and my firm. It is not right that I or they should be in the position we have been in coke, the policy pursued in reference to which has been the curse of the cement trade, and the burden of our lives.

Desperate diseases require desperate remedies; and I and my firm are very capable of throwing away £10,000—and for the matter of that £50,000—to protect our property and existence. The result is that we possess an enormous stock of coke on our premises at this moment. This was intended and foreseen. We could have got it in no other way, and at no other time. It was only by tempting with a high price that it could have been obtained. We are too well watched; and neither Mr. Livesey nor Horseferry Road would ever sell us what we asked for. The policy was always to prevent the accumulation of stocks, particularly in the large cement manufacturers' hands. We

need not use it. We shall buy when we can buy rationally; and we are very willing to buy now. But, in justice to our business and all that is committed to us, we cannot, longer than we must, endure to be forced at one particular time of year to contract on terms and conditions we have no voice in fixing, and which leave us and our trade at the mercy of foreigners, who get it cheaper than we.

I was sorry to see Colonel Makins's remarks that there was another outlet for Beckton coke, and they were now selling considerable quantities abroad; and he only hoped it would not get into foreign cement manufacturers' hands. Why, this, as Colonel Makins knows, is nothing at all new. It is precisely the very thing they have been doing all along, for very many years, to the utmost extent they could force an export, and at often far lower prices than they were exacting from English makers. Cheap steamers have been running for the supply of foreign cement manufacturers, and the appearance of a scarcity which was artificial has been created, keeping huge quantities up their sleeves, in order to support prices against English makers; while they have aided in building up foreign competition against us, fortified by the great power they possess, and the monopoly and privileges conferred upon them by the public, which, in coke, they have used against the public. Within a few weeks of the currency of our contract for 50,000 tons, they were supplying for export at 10s. 9d. and 10s. per ton, and have, we believe, lately offered 9s. per ton, and would now gladly take 8s. if they could get it. The costermonger gets it at present from one of the Gaslight and Coke stations on the Thames at 7s. 6d. per ton, by wheelbarrow or cart. The costermonger and dealer in carts and trucks is very often treated better and cheaper than the cement manufacturer, who takes it wholesale by barge load, with all the saving and economy in detail. They even stipulate with their buyers for export that the coke so sold shall not find its way to English manufacturers of cement on the Thames or Medway. If we fall into their power again, and, in consequence of the businesslike, necessary, and innocent measures we have taken to protect our trade, they should deem it expedient to decline to supply us, we desire least of all to suggest any menace, but we are ready to abandon our works—leave Northfleet a desert, and let our then starving working people settle matters with them through the Board of Trade.

There is no personal feeling, I am convinced and believe, on either side. I have no doubt they have been carrying out a policy they thought was in the pecuniary interest of the shareholders, taking a loss, as Colonel Makins intimates he thinks appropriate, in order to support a higher price to his cement customers who take the largest proportion of his coke. I am not dictating to them a policy. I only say it is, I think, shortsighted; and that my firm has grievously suffered. I have a right, without the imputation of a desire to injure others, in my humble way to have my policy; and my policy is to have a stock of coke, and to buy when I rationally can. I think I ought to buy as cheap as any foreigner.

Mr. Livesey's cheap philanthropy, I confess I find it difficult to follow. That there has been some wisdom in it, to the extent of giving back 10d. from the 13s. 4d. which he established on the top of my 12s. 6d.—both of which figures he says, and truly, were too much—had its object. No doubt he has his reward. But according to his own showing, was he not a little like Gehazi, who ran after him and took somewhat of him; while Naaman the Syrian, our friends of Horseferry Road, and I, the King of Israel, are both no doubt very bad fellows—but query if much worse than Gehazi? At all events, I will put in for Ahab, King of Israel, that Renan declares he was not a bad sort after all, and had scant justice done him by the compiler of Jewish History. In any case, he built very many public works.

Stone Park, Greenhithe, Feb. 14, 1896. THOMAS BEVAN.

SIR,—As a cement maker, I have read with lively interest your report of the recent meeting of The Gaslight and Coke Company, and also the letters and article thereon which you publish. Mr. F. A. White and Mr. G. Livesey have, each from his own point of view, dealt most ably with the questions at issue between the Governor of that Company and the cement trade. But I venture to think that it may be useful to supplement their arguments, drawn as they are, in part, from such considerations as the depression in the cement trade and the human nature in the cement makers, by a brief discussion of the matter, from a purely business point of view, as a question merely of supply and demand.

It is well known to everyone who has given a thought to the subject, that unduly high prices inevitably produce a reaction, not only by restricting consumption, as Mr. Livesey has in the present case pointed out, but also by attracting from new sources increased supplies. So it was that in 1894, when, at the "sweet will" of one or two individuals, regardless of attendant circumstances, the price of coke was fixed at 13s. 6d. per ton, supplies at once poured into the London district, first from one provincial town, then from another, till the price fell away far below the high contract price. The flow of provincial coke into London still continues, though the Metropolitan price has been reduced to 10s. per ton; and to-day even that price is maintained only by the action of The Gaslight and Coke Company in electing for the time to place their vast stores of coke on a broad basis in the Essex marshes, rather than let them go into consumption.

Coal, it must be remembered, was never cheaper than at the present moment; and there can be nothing in the cost of production of coke—itself a bye-product—to check the tendency to a further fall in its price. It becomes then almost a demonstrable proposition that, had The Gaslight and Coke Company accepted the cement makers' tenders last October, the price of the article would before this have again fallen away below the contract price in the same manner as last year.

In the report of the meeting of the South Metropolitan Gas Company, I read that Mr. Livesey told his shareholders that, in his opinion, the price of coke has now reached its lowest point. I venture most respectfully to differ from him. Including the provincial supplies available at present prices for the London district, the supply of coke is, I firmly believe, far in excess of the demand, and will continue to be so till the supplies from without are checked by a very considerable further reduction of price.

The moral of my letter is that the Governor of The Gaslight and Coke Company has nothing to fear from his old customers, the cement makers. They are, as Mr. White has said, willing buyers; and they will, in the future as in the past, support the market by consuming all the coke they need. The Governor's troubles come from a different quarter—viz., from provincial competitors whom his own action has brought into the market; and until he can get the better of these, the position he has taken up must of necessity be untenable.

In conclusion, I claim to have shown that such interference as there has been of late with the free action of supply and demand in determining the price of coke has been exercised, not by the cement makers as buyers, but by The Gaslight and Coke Company as sellers. "Corner" is as ill-omened a word as "ring." W. M. L.

Feb. 15, 1896.

The Recent Disaster at the Tynemouth Gas-Works.

SIR,—The principal lesson of this sad event is, to my mind, the illustration it affords of the deleterious nature of the waste vapours from the saturators of sulphate apparatus. They have already claimed more victims than the ordinary purifying-boxes of gas-works, though on a smaller scale, and less frequently worked, showing that the vapours are more strongly poisonous than ordinary foul coal gas. On account of their greater specific gravity, they diffuse more slowly. It therefore follows that the sulphate purifiers should be placed in the most open space available, and that arrangements should be made for the free ventilation of those out of use. Means by which this can be effected will readily suggest themselves. Where spare ground is available, the boxes can be done away with altogether, by placing old purifier grids, inverted V fashion, covering them with a sufficient thickness of oxide, and admitting the vapours into the hollow space. An effective way of carrying out this plan is to arrange them as a large X, admitting the foul gas at the centre. This arrangement will run for weeks or months without trouble; and it affords a large surface for dealing with extra bursts of gas.

The general public apathy as to the heroism exhibited on this occasion is notable. If three men, one an officer, had sacrificed their lives in an attempt to save their comrades on the battle-field, the whole country would have resounded with it. Unfortunately, "heroism at a sulphate works" does not make a catching headline, or appeal to the public fancy like any events in connection with the wholesale murder and mutilation which constitutes the modern, civilized, and Christian refinement on the primitive method of enforcing arguments.

Salisbury, Feb. 12, 1896. N. H. HUMPHRYS.

An Appeal.

SIR,—The sad accident that occurred recently at these works (and particulars of which appeared in your last issue) has called forth many expressions of sympathy for those so suddenly bereaved. The manner in which these workmen lost their lives—namely, two of them by a pure accident, and the others by being willing to risk their lives (which is the highest form the spirit of self-sacrifice can take) for the sake of those in danger, entitles the widows, of whom there are three, and the ten orphans to our sympathy and practical support. A Committee is being formed—consisting of an equal number of the Directors and workmen of the Tynemouth Gas Company—to get together a fund for their relief; and it is hoped that those connected with gas and kindred industries will be willing to assist in raising a substantial sum, so as to place those who have been so suddenly bereaved of their bread-winners beyond the fear of want. My Directors have voted the sum of one hundred guineas out of the funds of the Company; and have, in addition, given five guineas each. But as a sum of at least £1000 is required to do what is necessary, I shall be glad if you will allow me space in the "JOURNAL" to make an appeal for help to this deserving fund. Mr. Phillips, of Messrs. Woods and Co.'s Bank, North Shields, is the Treasurer; and any sums forwarded to him or any of the Gas Company's officials will be gladly received and acknowledged.

Tynemouth Gas-Works, North Shields, Feb. 11, 1896. W. HARDIE, JR., Manager.

The Relative Values of Crude Naphtha and Benzol.

SIR,—Mr. Major, "a refiner [of benzol] of considerable experience," has in your last issue a letter on the above subject, which, if it were as logical as its expressions are strong, would indeed demolish my argument. Mr. Major, however, begs the question; for, in my letter on p. 134 of the "JOURNAL" for Jan. 21, I have proved by incontrovertible figures that the constituents of crude naphtha other than benzol, although representing a very large proportion of the weight, only represent a very small proportion in money.

As to the profits to be made out of distilling crude naphtha, I know nothing; but I will take Mr. Major's own statement that 1d. per gallon is all he hopes for. Then the case, if we repeat my calculation as given in your issue for Feb. 4, becomes ever so much more striking; for, assuming the profit, with crude naphtha at 5d. and 90's benzol at 11d. to have been 1d. for distilling, it is quite clear that, with 90's benzol at (say) 2s. 4d., and crude naphtha at 10d., or a margin of 1s. 6d., the profits to be necessarily realized are not three times as large, as I modestly stated in my letter of Jan. 30 (in the "JOURNAL" for Feb. 4), but eighteen times as much.

I am very glad Mr. Major supplied me with this no doubt reliable basis of calculation; and it is quite certain that, however much benzol distillers who buy crude naphtha should wish it to remain at a ridiculously low figure, the producers will not be of the same opinion. Eighteen times, or let us say *ten times* (for we can afford to be liberal), *the usual trade profit* is surely very nice, in these times of depression.

Manchester, Feb. 12, 1896. HENRY SIMON.

Stoppages in Ascension-Pipes.

SIR,—In the "JOURNAL" for the 28th ult. (p. 175), there is an abstract from the "Chemiker Zeitung" in regard to the above subject. It is there recommended to use water in the ascension-pipes to

prevent the formation of thick tar. It would be of interest to hear the experience of others in respect to this. I used it on a large scale many years ago, but without good results. Reference to this subject gives me an opportunity of mentioning some experiences of a rather peculiar kind which I have had with stopped pipes, and which I think may be of interest to other gas engineers, who have probably observed something similar.

It is a well-known fact that retorts are not usually tight when they are quite new, or have been burned out for removing the carbon; and that they become tight when the fissures are filled with it. The following case, however, is very seldom met with: In November, 1884, ten settings were for the first time put into use with new retorts. They were of the ordinary oval shape, and arranged seven in each setting. The coals were from Newcastle. The hydraulic main was filled with water; and the dips were 1½ inches. That the formation of tar did not immediately occur was not surprising, as this had been previously noticed. But in this case it did not form at all. The only thing formed was soot, which stopped the ascension-pipes and the hydraulic main, and from there passed on to the gas-mains. Tar was not formed, although many different things, as well as lower and higher heat, were tried. At the same time, the production of gas was so small that it was evident a great deal was lost; and the temperature in the hydraulic mains and stand-pipes was remarkably low. It was very important to find out the reason for this serious state of affairs, as it had continued several days without any sign of improvement. After having examined the retorts very carefully, both inside and out, I found at the end of the retorts, close to the mouthpieces, a great number of fine fissures, from 6 to 8 inches long, and even longer, running principally in the direction of the axes of the retorts; and out of these fissures the gas was burning in the setting. After this was noticed, it seemed evident that the following had been the process: The small fissures which are often found in retorts are closed, when the temperature is high, by carbon formed by the decomposition of the hydrocarbons; but near the mouthpiece, the temperature is not sufficiently high to form carbon, but still high enough to decompose the greatest part of the hydrocarbons, when they pass the fine fissures, setting the soot free at their entrance, and carrying it farther on with the stream of gas. Here it is something like an open wound, which cannot be closed by the porous soot; yet about 2 feet from the end of the retort, where the temperature is high enough, this soot is converted into carbon.

After this had been made evident, the retorts were well smeared on the inside, near the mouthpieces, with a large paint-brush fixed vertically on the end of a wooden rod and dipped in a thin fire-clay mortar. After this operation, the formation of soot immediately ceased, and thin tar filled the hydraulic main as usual. It was found that these retorts were made of a rather frail material; and some others, not in use (part of the same delivery), were also found to have a number of more or less fine fissures in the same place. These retorts worked very satisfactorily later on; but they were always smeared well after they had been burned out. The same plan has been adopted ever since with all retorts after burning out, firing up, &c., while they are warm; and I have never had any difficulty of the kind referred to, or thick tar in the hydraulic main.

In order to show that the fault really was as here mentioned, I may add that in the previous year I had some trouble with a new bench of retorts, and thick tar in the hydraulic mains, &c., though the other benches, using the same coals, worked well. I could not then find the reason for this difference. But after what I have stated above occurred in 1884, it was clear to me, especially as the retorts were a portion of the same order. In December, 1884, some of these retorts began to cause the formation of thick tar in the hydraulic main. They were then smeared; and it immediately ceased.

I am convinced that the reason I have given for the formation of thick tar (soot and tar) is more general than is ordinarily believed. Things usually right themselves after a time; but when the trouble is so predominant as it was here, it is necessary to give a little help. The cure is very easy of application; and it may be recommended for trial in all cases where thick tar is formed in hydraulic mains. Of course, there may be other causes for its formation—as, for example, the retorts not being well filled with coals, the use of too high heat, &c.; but the reason here mentioned is only one more.

Copenhagen, Feb. 7, 1896. IRMINGER.

A Single Pipe for Gasholder Inlet and Outlet.

SIR,—Being desirous of obtaining opinions as to the practicability or otherwise of a single pipe being made to serve the double purpose of inlet and outlet to gasholders, I beg to inquire, through the medium of the "JOURNAL," if any gas engineer has given such an idea his consideration, and, if so, with what result. My opinion is that such an arrangement would be decidedly advantageous in the event of a gasholder being built a considerable distance from the valve-house, when, under the present method, a double line of pipes would require to be laid to and from the holder; but with the above plan, a single pipe could be run to it, immediately after the valve, with a T-piece and valve thereon, to the town governor, wherever desirable. This would also mean a considerable saving in cost if the gasholder were a large one, having correspondingly large mains, as the necessary piping would then be reduced to a minimum.

This scheme would in no way interfere with the efficiency of the town supply, inasmuch as the outgoing gas would still be regulated by the governors as before. I also think it would do much towards clearing away the existing lighting complaints, caused by the consumption of an inferior layer of gas in holder storage (continuous while such layer lasts); because, in the event of a gasholder—say, half full, and with inlet and outlet valves both open—having piping according to the above idea, the result would be that the inlet gas would draw the stored gas, which at that period might be a layer of inferior quality, into the outlet-pipe, and would mix with the gas coming from the meter—thus materially benefiting the town's supply.

It may be urged that the outgoing gas would be rendered still less illuminative if the inlet supply were to be of even a more inferior quality than the most inferior in the gasholder if these two were to meet and mix. But in such a case it would only be necessary to close the gasholder inlet-valve, and admit the gas into another to be stored meanwhile, until a better kind was manufactured, while the town supply was maintained as before—only being taken direct from the gasholder without the admixture of gas from the station meter. This possible error would be entirely obviated in any works where, together with a competent foreman, or valveman, there is a jet photometer always representing the illuminating power of the gas going through the station meter, when, if that gas be poor, the above treatment would prevent any reduction in the quality of the stored gas.

There may, of course, be some insurmountable objections to this arrangement; but I should be pleased to hear of them, as I am at present of opinion that in many cases the monetary advantages would be very considerable, and that the benefits accruing from its adoption would overcome any disadvantages there may be against it.

Luton, Feb. 14, 1896. JOHN M. CAMPBELL.

Cheap Gas for Other than Lighting Purposes.

SIR,—The Gas Committee of the Stratford-on-Avon Corporation are desirous of obtaining particulars of the various systems in operation whereby consumers using gas for cooking and heating purposes pay less for the quantity thus consumed than they do for what is used for lighting. I shall be glad if those of my brother managers who have adopted any system for this purpose will have the kindness to communicate the results of their experience and the plan they adopt.

Stratford-on-Avon, Feb. 12, 1896. J. S. CRANMER.

Sulphur in the Products of Gas Combustion.

Referring to the paragraph on the above subject which appeared last week, Mr. W. C. Young, F.I.C., F.C.S., reminds us that, in a paper published in the "Analyst" for November, 1879, and reproduced in the "JOURNAL" at the time (Vol. XXXIV., p. 746), he showed conclusively that the whole of the sulphur in coal gas was converted into sulphur dioxide during combustion.

The Bequest for the Purchase of the Kendal Water-Works.—Duty has been paid on £148,461, the value of the personal estate of the late Alderman William Bindloss, of Kendal, and probate has been issued to the executors, who are charged with the application of £30,000 for covering the expenses incurred or likely to be incurred in the purchase, extension, or improvement of Kendal Water-Works.

Reduction in the Price of Gas at Sheffield.—The Directors of the Sheffield United Gas Company have decided to reduce the price of gas 2d. per 1000 cubic feet to all classes of the consumers, the reduction to take effect after the reading of the meter indices for the Lady-day accounts. The result will be a benefit to the consumers of £15,029 per annum, and to the Corporation for public lamps of £1241 per annum—the total reduction amounting to £16,270 a year.

Sales of Shares.—At a recent sale by auction at Salisbury, eight ordinary 10 per cent. £12 10s. shares of the Salisbury Gas Company realized £29 and £29 15s. per share; four new ordinary 7 per cent. shares, £20 5s. each; and six 5 per cent. preference shares, £15 17s. 6d. each.——Last Tuesday, five fully-paid £10 shares in the Ashford Gas Company realized an average of £21 each; and five £5 shares on which £3 had been paid, £6 10s. each.——On Wednesday, 250 ordinary £10 shares in the Norwich Water Company changed hands at an average price of £19 13s. 3d. per share; and 600 "B" £5 shares in the Ilford Gas Company averaged £8 10s. apiece.——Eighty 7 per cent. £10 shares in the Calverley and Horsforth Gas Company were sold by auction last Wednesday. The premiums paid averaged a little over £3 3s. per share.

New Joint-Stock Companies.—The Incandescent Fire Mantel and Stove Company, Limited, has been registered with a capital of £125,000, in £1 shares, to adopt and carry into effect an agreement made between P. G. Overbury and D. Macphail for the acquisition, by purchase or otherwise, of the British patent No. 2470 of 1895, the German application No. 23,325 of 1895, and the French application No. 2,339,121 of 1895, respecting an invention for improvements in or relating to fireplaces or stoves; to develop and turn to account these patents; and to carry on business as manufacturers of and dealers in fire-frames and stoves and grates, ranges, stoves, and fuel of every description. The Standard Oil Company of Galicia, Limited, has been registered with a capital of £100, in £1 shares, to prospect, explore, and test ground supposed to contain petroleum or other oil, and for this purpose to sink wells.

Newport (Mon.) Gas-Works Benefit Society.—The twenty-first annual dinner of this Society was held on Monday, the 10th inst.—Mr. F. Canning, J.P., Assoc.M.Inst.C.E., the Engineer and Manager of the Newport Gas Company, in the chair. In proposing "Success to the Newport Gas-Works Benefit Society," the Chairman said it was a good many years since it was founded. That was the twenty-first annual dinner; and he had had the honour and privilege of occupying the chair at every one of them. As a proof of the growth of the Society, he mentioned that in its first year, the income was £46 12s. 6d.; while the income for the year just ended was £222 11s. 7d. Again, whereas in 1875 they spent the whole of their income, in 1895 they spent £104 8s. 5d. in sick and funeral benefits, were able to divide something among the members, and also add to the reserve fund which they had wisely provided. With the toast he coupled the name of Mr. J. Whitefield, to whose labours as Secretary, he said, much of the Society's success was due. Mr. Whitefield, in responding, said that during its existence, the Society had received £2700, had buried 29 members, 19 members' wives, and 77 members' children. There were now 190 members. Mr. Chandler Evans proposed "Prosperity to the Town and Trade of Newport." In so doing, he remarked that as long as the gas-works were presided over by so energetic a Manager as Mr. Canning, he ventured to think the Company would continue to be most prosperous. Other toasts followed.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The Second Session of the Twenty-sixth Parliament of the United Kingdom was opened last Tuesday by Commission. Among the first business was, as usual, the determination of the House in which the respective Private Bills should be first considered. This was the result of a conference between the Chairmen of Committees of the two Houses, at which it was decided that the following Bills, in which our readers are interested, should originate in the Upper House:—

Aldershot Gas and Water Bill, Birmingham Corporation Water Bill, British Gaslight Company (Norwich) Bill, Cheltenham Corporation Gas Bill, Cheltenham Gas Bill, Cowes Gas Bill, Dublin Corporation Bill, East Surrey Water Bill, Falkirk and District Water Bill, Malvern Link Bill, Manchester Corporation Bill, Newcastle-upon-Tyne and Gateshead Gas Bill, Padiham Urban District Council Water (Extension of Time) Bill, Redheugh Bridge Bill, Ystrad Gas and Water Bill, Ystradyfodwg Urban District Council Gas and Water Bill.

On Friday, the Chairman of Committees acquainted the House that, pursuant to the resolutions of the 4th of July last, as extended by the order of the 19th of August, respecting Private and Provisional Order Confirmation Bills, the Barnsley Corporation Water Bill, the Dewsbury and Heckmondwike Water Bill, and the Rotherham Corporation Bill (all suspended from session 1895) had been severally lodged in the Private Bill Office, together with the required declaration of the officer or agent in each case. These Bills were accordingly presented, read the first and second time, Committees negatived, Bills read the third time, passed, and sent to the Commons.

HOUSE OF COMMONS.

The following Bills, in which our readers are interested, will originate in the Lower House:—

Barry Urban District Council Bill, Bexhill Water and Gas Bill, Bilston Improvement Bill, Bournemouth Gas and Water Bill, Brighton Corporation Water Bill, Burton-upon-Trent Corporation Bill, Chester Corporation Bill, Colwyn Bay and District Gas Bill, Drogheda Corporation Bill, Eastbourne Corporation Water Bill, Eastbourne Water Bill, East London Water (Height of Supply) Bill, Edinburgh Extension Bill, Fylde Water Bill, Guildford Gas Bill, Huddersfield Water Bill, Ilfracombe Gas Bill, Kent Water Board Bill, Kirkcaldy and Dysart Water Bill, Lanarkshire (Middle Ward District) Water Bill, Leamington Corporation Bill, London Sea Water Supply Bill, Matlock Bath Gas Bill, New River Company Bill, Porthcawl Water Bill, Portsmouth (Borough) Water Bill, Sheffield Corporation Water Bill, South Metropolitan Gas Bill, Southwark and Vauxhall Water Bill, Staines Reservoirs Bill, Whittington Gas Bill.

Among the first private members' Bills introduced last week were the following: Boards of Conciliation Bill, Coal Mines Regulation Act (1887) Amendment Bill, Miners (Eight Hours) Bill, Rating of Machinery Bill, Rivers Pollution Prevention Bill.

A petition for inquiry into the working of the Metropolitan Gas Companies was presented from Shoreditch.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, Feb. 14.

(*Before Mr. Justice* KEKEWICH.)

The Sunlight Incandescent Gas-Lamp Company, Limited, v. The Incandescent Gas-Light Company, Limited.

Mr. ROGER WALLACE, Q.C., said he had a motion in this case for an interim injunction pending the trial. Mr. Moulton and Mr. Walter were on the other side; and he had been trying to arrange with them that they should keep an account. But they could not make up their minds at present to do so.

Justice KEKEWICH said they must keep an account, for their own sake, whether they undertook to do so or not, unless they were bogus tradesmen.

Mr. WALLACE said this was a patent granted to Messrs. S. L. and W. F. Rawson for the manufacture of incandescent mantles——

Justice KEKEWICH: They are very troublesome things.

Mr. WALLACE acknowledged that they were; and the object of the patent was, he said, to get rid of that trouble. Messrs. Rawson carefully studied the matter, and in the year 1886 took out a patent.

Justice KEKEWICH said he had a strong objection to being told all these matters, because no good ever came of it; and it was only waste of time. The defendants must, for their own sakes, keep an account; and it could not hurt them to undertake to do so.

Mr. MOULTON, Q.C., said of course the defendants always did keep an account. The only thing he wanted was that no use should be made of the undertaking. There had been cases in which such an undertaking had been advertised as if it had been a decision against the defendants.

Justice KEKEWICH said it certainly ought not to be advertised, because it might prejudice the case outside. Of course, no use could be made of it in that Court, as no Judge who knew his business would listen to it.

Mr. MOULTON said if his friend would assure him that his clients would not make any use of it, he would freely undertake that a proper account should be kept, as it would be in any case.

Mr. WALLACE said he did not know why this suggestion should be made, when the defendants were constantly advertising that the plaintiffs were doing the same thing as they were.

Justice KEKEWICH said the whole thing must be kept *in medio* until the trial.

Mr. WALLACE: Certainly.

Mr. MOULTON said, that being understood, he supposed the usua order would be made.

Justice KEKEWICH considered it ought not to be advertised; and the more they talked about it, the more likely it was to get into the papers. There would be no order on the motion, except that the costs would be costs in the action.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Feb. 7 to 11.

(*Before the* LORD CHIEF JUSTICE *and a Special Jury.*)

Macaire v. The East London Water-Works Company.

This was an action brought by a licensed victualler carrying on business at the Golden Horse, Forest Gate, to recover damages for loss sustained on Feb. 17, 1895, through an escape of water from an alleged defective plug of the defendants. The water filled the cellar and spoilt a quantity of wine and spirits. The plaintiff paid £5 18s. for the use of the fire-engine to get rid of the water; and he estimated the damage done to the building at £125. He took the house in October, 1893, on a repairing lease, having about thirty years to run, at a rental of £80 a year.

Mr. CHANNELL, Q.C., and Mr. HANSELL appeared for the plaintiff; Mr. CRIPPS, Q.C., Mr. DARLING, Q.C., and Mr. R. M. BRAY represented the defendants.

Plaintiff having given evidence in support of his case, in the course of cross-examination said that, in the particulars of damage, he put down his whisky at the price at which it would have sold; but he could replace it at a lower figure. Stock was taken for him four or five months prior to the accident; but, of course, he could not give the exact quantity of whisky, &c., which was spoilt—he could only estimate it. In his first letter to the Company, he did not mention the wine and spirits; but this was because it escaped his memory. Some of the Company's servants had seen the casks.

Evidence having been given by builders and others as to the damage done to the plaintiff's premises, the effect of which was that the flooding had caused a settlement in the flank wall, rendering underpinning necessary,

The LORD CHIEF JUSTICE said the only point for the jury would be whether there was negligence on the part of the defendants, and, if so, what were the damages.

Mr. DARLING, in opening the case for the defence, said the question for the jury (apart from a submission which he understood his learned friend was going to make, that his clients were liable even without negligence) was whether the Company were guilty of negligence in the exercise of those powers which were granted to them by statute. The Company were entrusted by Parliament with the duty of supplying water to people in London by means of mains under the roads. They were also bound to provide water for putting out fires; and for this purpose, fire-plugs were placed all over their system. The fire-plug in question would have been safe but for an unprecedented frost, which lasted all January and February and a considerable part of March. This was not the first time that the action of frost had been set up as a defence in a suit of this kind; and in some cases, it had been held that the Company were not guilty of negligence.

Evidence was then given as to the damage done; the condition of the plug, and its fitness for the purpose for which it was used; and the action of the frost, which it was said had the effect of lifting the plug upwards, and thereby loosening it.

Counsel having addressed the jury,

The LORD CHIEF JUSTICE, in summing up, said the action was framed in two ways: First, the plaintiff said that, under the provisions of the Act of Parliament by which the Company had acquired the right, for their own profit, of supplying the public with water, they were in the position of insurers. But the case the jury had to deal with was whether the defendants were guilty of negligence by reason of the improper and defective condition of the appliances in connection with their main, particularly the fire-plug. Ordinarily, a jury would be entitled to regard inundation by water from the mains of the Company as *primâ facie* evidence that the Company were responsible, and to call upon them for an explanation. But he hesitated to direct them that the occurrences in the peculiar circumstances of this case did make a *primâ facie* case. For the purpose of this question, the jury were to understand that the defendants were not insurers; in other words, they did not undertake that there might not be damage done to the adjoining premises by reason of an escape of water. But what they were bound to do was to conduct their business with due and proper care; and, looking to the large powers vested in water companies, the jury ought to exact from them a high degree of care. They would probably think that, if there were no satisfactory explanation consistent with due care, the escape of water causing damage to an adjoining dwelling would be enough for the plaintiff. But in this instance—there being exceptional circumstances because of the abnormal condition of things owing to the length and severity of the frost—he did not consider this was the case. The first question was what was the cause of the accident. The plaintiff said that the appliances, and especially this particular plug, in connection with the main were not proper, inasmuch as the plug was not a proper one; or if it was capable, so as to be effective for its purpose, it was not used in an effective way. The defendants, on the other hand, said the plug was perfectly good. But, in the circumstances of this frost, one of two things happened—either there was such disturbance of the plug by pressure upwards from the frost, or such a general uplifting of the ground itself by the frost, as to alter the position of the plug, which was a proper one, and was displaced to some slight extent; and in consequence of such disturbance this accident occurred. The learned Judge then reviewed the evidence at great length, and called attention to the

fact that the frost continued after the occurrence, and that, when a new plug was put in, it answered its purpose, and was not displaced by any adverse influences. It was, he said, clear upon the evidence that these water-plug arrangements were carried out upon a uniform principle over a large area, and that they amounted to a very considerable number in the case of this particular Company. In this state of things, it would have been open to the defendants to show that what had happened to the plaintiff had occurred to others. The defendants were well advised; and the jury would be surprised that such evidence, if it would have benefited them, was not forthcoming. He asked them to consider the whole matter, and, in any event, to divide the damages under two heads: (1) The damage in respect to the house itself; and (2) the damage to the stock. After pointing out that the evidence of the plaintiff with regard to the stock was unsatisfactory, and that the defendants denied that there was any structural damage whatever to the house, he left it to the jury to say whether the plaintiff had established to their satisfaction that the accident was caused by the defendants' negligence, and, if so, what were the damages.

The jury found a verdict for the plaintiff for £140, made up as follows: For damage to the house and premises, £80; and for damage to the stock and business, and for personal inconvenience, £60.

Thursday, Feb. 13.

(*Before Lords Justices* LINDLEY *and* KAY.)

Kyffin v. The East London Water-Works Company.

This was a case stated by a Metropolitan Police Magistrate for the opinion of the High Court under the following circumstances: Mr. J. B. Kyffin (the appellant) sued the East London Water Company to recover penalties for having neglected, on July 16 and 17, 1895, to supply his premises in the Hackney Road with a sufficient quantity of water for domestic purposes. At the hearing of the complaint (see "JOURNAL," Vol. LXVI., p. 243), the appellant, who was the only witness called, stated that he was the occupier of the premises in question, and that the Company had unlawfully failed to supply him with a sufficient quantity of water for domestic purposes. Upon this evidence, it was contended that the Company had contravened the provisions of section 7 of the Metropolis Water Act, 1871, and had incurred the penalty provided by section 16 of that Act. On behalf of the Company, the following points were taken: (1) That a private individual could not institute proceedings under the sections named; (2) that it must be proved that the Company had been required to give a constant supply, and that the other conditions contained in sections 8 to 12 of the Act had been fulfilled, and that the notice prescribed by section 16 had been given; (3) that the constant supply was to a district, and not to an individual; and (4) that a person could not take proceedings against the Company unless he had paid his water-rate in advance. It was admitted by the appellant that he had not complied with this condition. The Magistrate decided in favour of the Company; and the question for the Court was whether or not he was right in so doing.

Mr. BOUSFIELD, Q.C., and Mr. ELDRIDGE appeared for the appellant; Mr. DARLING, Q.C., Mr. CRIPPS, Q.C., and Mr. R. M. BRAY represented the respondents.

At the close of the arguments,

Lord Justice LINDLEY delivered judgment. He said this was a case stated by one of the Metropolitan Police Magistrates, who refused to fine the East London Water Company, at the instance of a consumer named Kyffin. The facts were briefly these: Mr. Kyffin was the occupier of some houses, or a house, in the Hackney Road, which was within the district served with water by the Company; and he had filed or laid an information complaining that the Company had failed to "supply a sufficient quantity of water for domestic purposes." He (the learned Judge) was not going to criticize the language of the information. But there was evidently a great deal of ambiguity about it; and it was consistent with several interpretations. It did not state whom the Company had failed to supply—whether the district or the particular house—with water. The Magistrate seemed to have thought that the informant was not entitled to the penalty he asked to have imposed, because some notice referred to in section 16 of the Act of 1871 had not been given. But he (the learned Judge) had pointed out during the argument that, when they came to look at that section, the notice referred to therein really had no reference to the complaint of this gentleman. The notice was required to be given by the central authority—the Board of Trade formerly, and now the Local Government Board—to the Company to continue to furnish a supply of water. The particular ground on which the Magistrate had decided appeared to him (his Lordship) to proceed on a misconstruction of the section; and, in fact, Counsel for the Company had admitted this as soon as their attention had been called to it. The real question here was an extremely important one. It was whether an inhabitant who considered he was aggrieved was entitled to proceed for penalties imposed by the 16th section of the Act of 1871. That section ran thus:

> Any company which violates, refuses, or neglects to comply with any of the preceding provisions of this Act shall be liable to a penalty not exceeding two hundred pounds, and to a further penalty not exceeding one hundred pounds for every month during which such violation, or refusal, or neglect to comply with the said provisions continues, after they shall have received notice in writing from the Board of Trade to discontinue such violation, refusal, or neglect, as aforesaid.

This was the notice to which he had referred; and the appellant's contention was that, notwithstanding the sections he would now read—sections 44 and 45—he was entitled to enforce that very heavy penalty. Section 44 showed the way in which it was imposed, and also, to his mind, who was to sue for it:

> Every penalty incurred by any company by reason of non-compliance with any of the provisions of this Act, shall go and belong to the Metropolitan authority within the jurisdiction of which the same has been incurred, and may be sued for, and recovered by, such Metropolitan authority in any court of competent jurisdiction for the recovery of any ordinary simple contract debt of the like amount, and shall be paid and applied as such Metropolitan authority shall from time to time direct. Every such penalty shall be borne and paid (to the satisfaction of the Auditor appointed as in this Act provided) exclusively by and out of the divisible profits of the company by whom the penalty is incurred, and by way of reduction of dividend.
>
> Except as is by the next preceding section expressly provided, all penalties under this Act may be sued for and recovered in the Court of Summary Jurisdiction.

Now, penalties to be incurred by a company evidently were not to go to the common informer; and they did not go to the Exchequer. They went to the Metropolitan authority; and they might be sued for, and recovered by, that authority by an action. The appellant contended that, notwithstanding this, he was, as a "person aggrieved," entitled to sue for the penalty—not for his own benefit, but in order to put the money at the disposition of the Metropolitan authority. At first sight, there appeared to be some little difficulty about that. But the Court had been referred by Counsel for the Company to the Water-Works Clauses Act, 1847; and when they came to look at the two Acts, he thought their argument ought to prevail. It was quite obvious that, under section 43 of the Act of 1847, any inhabitant who was aggrieved by not receiving the water to which he was entitled under its provisions, could proceed for the penalty there referred to, which was a comparatively small one—£10—and they were also to forfeit to the town commissioners, and to "every person having paid or tendered the rate," the sum of 40s. for "every day during which such refusal or neglect shall continue after notice in writing shall have been given to the undertakers of the want of supply." Unfortunately for the appellant in the present case, he could not ask to have put in force section 43 of the Act of 1847, because he had not paid his rate in advance, which was a condition precedent to taking action. Therefore, the remedy he had for any injury inflicted upon, or sustained by, him under that section he was not in a position to pursue. This being the case, he said: "Apart from that, I can sue for the penalty imposed by section 16 of the Act of 1871, because you have failed to comply with the provisions of section 7 of that Act." Section 7 of the Act of 1871 was not addressed to the supply of each particular inhabitant, but to something which was then new—namely, the constant service of water to districts. The section ran thus:

> Subject to the provisions of this Act, every company may, and from and after the expiration of eight months from the passing of this Act every company shall, when required so to do, in the manner directed by this Act, provide and keep throughout their water limits, or throughout such parts of such limits as they may be required in manner aforesaid, a constant supply of pure and wholesome water sufficient for the domestic purposes of the inhabitants within such water limits constantly laid on at such pressure as will make such water reach the top storey of the highest houses within such water limits (but not exceeding the level prescribed by the Special Act) of such company, which supply is in this Act referred to as a "constant supply;" and every such company shall, subject to the provisions of the Special Act as the same are amended by this Act, give and continue to give to such inhabitants a constant supply for domestic purposes in manner prescribed.

Now, the appellant said: "I am aggrieved because I did not receive the constant supply for domestic purposes, and therefore I shall sue for the penalty under that section." This meant under the £200 penalty section; and it certainly would be curious if a person who could not sue under section 43 of the Act of 1847, in respect of injury done to himself personally, could sue for that very same injury done to him personally under section 7 of the Act of 1871, and ask for the penalty of £200. It did not seem to be consistent. It appeared to him (the learned Judge) that there were two distinct principles underlying the structure of the 1871 Act. As regarded constant service districts, the supplying company were responsible to a Metropolitan authority; and it was for them to enforce the penalties imposed upon the company by that Act for failure to supply a district. For these the authority was the proper and the only party to sue. This did not in the least deprive any person of his right to complain of a deficient supply to him personally; his remedy being under section 43 of the Act of 1847. This seemed to make the whole legislation consistent, and also to be in accordance with what appeared to him to be the obvious scope of the legislation. There was a great deal of good sense in that, because they knew perfectly well that the constant service of water was an extremely onerous burden; and there were sections of the Act which relieved a company from liability for not giving it, if, owing to any drought or accident, they were prevented from so doing. All these matters could be very much better considered by a Metropolitan authority than by any particular inhabitant who might happen to be aggrieved by not receiving what he thought was a sufficient supply of water. He (his Lordship) was quite satisfied, when they looked at it, that the scheme of the Act of Parliament was that for which Mr. Darling had contended, and that the appeal must be dismissed. The appellant had an adequate remedy; but it was under section 43 of the Act of 1847, and not at all under the Act of 1871. He therefore came to the conclusion that, if the appellant was suing for penalties for a non-constant supply of water to the district, he was not the proper person to sue; while if he was suing on account of injury to himself personally, he was out of Court, because he had not complied with the provisions of section 43 of the Act of 1847.

Lord Justice KAY said he was of the same opinion. Looking at the Act of 1871 alone, there was a difficulty; and a very ingenious argument had been raised upon that statute. He confessed it was not easy to get over the difficulty raised by that argument, if that statute stood alone. But when they looked at the whole scheme of legislation, it was easy to see what was meant. By the Act of 1847—the General Act—an individual who did not get a proper supply of water had a remedy given to him to recover a penalty which was to go into his own pocket—at any rate, as to the 40s. a day—and that remedy could be enforced, they were told, by summary proceedings. But these were subject to a condition precedent—and a very reasonable one—that the person aggrieved should have paid his rate. The penalty was £10, and 40s. a day. In 1871 came a statute which enacted that, upon the requisition of a Metropolitan authority, the undertakers were to be obliged to supply water constantly to a particular district; and if they failed to do this, they were liable to a very large penalty indeed—viz., £200—and £100 a month for every

month during which they neglected to comply with the requisition. Then there was a special provision—and it was a very curious one—in section 44, that these penalties might be recovered by the authorities by action in any Court which would give them a remedy to recover a simple contract debt for the same amount. This section showed the means by which penalties payable under the Act were to be recovered. Then there followed a section which specified that, except as mentioned in the preceding section, all penalties might be sued for and recovered in a Court of Summary Jurisdiction. First of all, it had struck him that one might reconcile these two sections in this way. Section 44 enabled the Metropolitan authority to recover the amount by action, as though it were a debt; and section 45 enabled it to be recovered in a Court of Summary Jurisdiction—that it might be, as *primâ facie* it always was, recovered by anybody. But, at any rate, it had, under section 44, to go to the authority. The question was, whether the remedy by action, looking at section 45, was intended to be the only one for the recovery of the penalty, or whether, under section 45, it might be recovered by any other person in a Court of Summary Jurisdiction. This was a difficulty which, if the Act stood alone, it might not be very easy to overcome. But when they looked at the Act of 1871 and the preceding Act of 1847, the difficulty vanished. It would be the most ludicrous thing in the world if an inhabitant who had not a sufficient supply of water could not take any proceedings under the Act of 1847 until he had paid his rate, even to get the penalty of 40s. a day, or any other coming to him under that Act, yet might, under the Act of 1871, take steps to recover the £200 penalty and the £100 a month. It was, as he had said, ludicrous to suppose that the Legislature meant this, when the two Acts were read together. To his mind, the plain meaning of all the legislation was this: The inhabitant who did not get a sufficient supply of water might take proceedings under the General Act of 1847. Under that Act, if he had paid his rate (subject, of course, to that condition precedent), he might recover a small penalty. But not giving a supply of water to a district was a matter between the Metropolitan authority and the supplying company; and the authority were the people to make the requisition. If it was not complied with, a heavy penalty was imposed; and the party to recover it was the authority who had made the requisition, and not the inhabitant who, by reason of the supply not being constant, alleged that he did not get all the water he wanted for his domestic purposes. This made the two Acts perfectly consistent. It made the legislation intelligible; and it avoided that which he could not help saying would be a gross absurdity. He therefore thought—though he did not agree with the special reason given by the Magistrate (which, indeed, had been disavowed at the Bar)—this was a case in which the appellant, not having paid his rate, had no right to proceed for penalties under that Act. The appeal would therefore be dismissed, with costs.

Mr. BOUSFIELD, with regard to costs, pointed out that the Magistrate had decided on one point; and it really was upon that point that they had come to the Court.

Lord Justice LINDLEY: He did not decide that point in your favour.

Mr. BOUSFIELD: No; against us. But the point taken then, and now admitted by my friends to be wrong, they are responsible for.

Lord Justice LINDLEY: You must pay the costs. I think the appeal ought to be dismissed with costs. I consider it is a very outrageous business, now that I understand it.

Rival Lamps for External Shop Lighting.

In the Chancery Division of the High Court of Justice, on the 7th and 8th inst., two motions came before Mr. Justice North bearing upon the above subject. One was by Mr. Clark, asking for an injunction to restrain Messrs. Julius Sax and Co. from making electric lanterns for external shop lighting in infringement of his registered design; and the other was a cross-motion by Messrs. Sax, to remove the design from the register. The contention on the part of Messrs. Sax (for whom Mr. Vernon Smith, Q.C., and Mr. Church appeared) was that the design registered by Mr. Clark was practically identical with that of lanterns made for lighting shop-fronts by gas-lamps of the Wenham, Thomas, and Fullford construction. On the other hand, it was argued by Mr. Swinfen Eady, Q.C. (Mr. Metcalfe with him), that the adaptation of such lanterns to electric lighting by the removal of the chimney necessary for gas-lamps, and the substitution of an arrangement for ventilation, constituted such a novelty as entitled Mr. Clark to register the design, and restrain infringements. A number of affidavits were read, including one by Mr. W. Sugg, and another by Mr. Sheldrake, formerly the Manager of the Wenham Company. Various lanterns were exhibited; and it was pointed out by Mr. Vernon Smith that Messrs. Sax's lantern was, as to the upper ventilating portion, of a different design from Mr. Clark's, and was not therefore an infringement, even if it should be held that the latter was entitled to remain on the register. Mr. A. G. Seaman, the Manager for the defendants, was cross-examined by Mr. Eady on a statement made by him in an affidavit in reply, that the Wenham and Fullford lanterns could be used for electric lighting by simply removing the gas-burner and substituting an electric lamp. After a long argument by Mr. Eady, and a brief reply by Mr. Vernon Smith, his Lordship, in giving judgment, held that both motions must fail. He said he did not consider that the plaintiff could register as a new design for electric lighting a form of lantern which had been previously used for gas. In the present case, the frame of the lantern was exactly similar to that in the Thomas and Fullford lanterns; but these had chimneys which in the plaintiff's lamp were replaced by what he might call the superstructure put on the top of the case for the purpose of ventilation. Taking this superstructure in combination with the case of the lantern, he could not say there was not sufficient novelty to entitle the plaintiff to registration. But, on the other hand, the defendants' superstructure was not of the same shape or design as the plaintiff's; and his lamp was therefore not an infringement. The result was that both motions must be dismissed, with costs.

In re the Winding Up of the South Kent Water Company.

The petition presented by Messrs. Oakes and Co. for the compulsory winding up of the above-named Company, which has been standing over for some time with a view to an arrangement being come to, was again in the list for hearing last Wednesday, before Mr. Justice Vaughan Williams. Mr. Chubb, who represented the petitioners, stated that negotiations were in progress for a settlement; and it was believed that, if a further adjournment for a month were acceded to, the arrangement would be carried out. Mr. Jenkins, for the Company, supported the application; and his Lordship ordered the petition to stand over as requested.

A Question as to the Non-Delivery of Water During Drought.

In the High Court of Justice for Ireland, an action was recently brought by the Camlough Water-Works Trustees against the Newry Navigation Company to recover £200, being two years' rent payable to them under the Newry Improvement and Water-Works Act, 1871, in respect of the supply of water delivered by the Trustees to the Company under the Act. The defendants did not deny that the rent was payable; but they claimed to be entitled to an abatement of £100 by reason of the failure of the Trustees to deliver the prescribed quantity of water to them during the autumn of 1893. The plaintiffs admitted that for 72 days in that year the prescribed quantity was not delivered to the defendants; but they allege that this was due to the excessive drought of that year—a circumstance over which they had no control, and that, consequently, they were released from the penalty imposed by the Act for the non-delivery of the prescribed supply. Under the Act, the Newry Navigation Company were liable to a rent of £100 a year; but by section 100, it was provided that "if in any year between 1st January and 31st December the Trustees failed to deliver, after the expiration of 24 hours' notice of such failure, the daily quantity of water prescribed to be delivered out of Camlough Lake down the Camlough River, an abatement of £2 per day for each day of such failure should thereupon be made, and might be retained by them from the rent of the year then current." For the plaintiffs, it was contended that failure applied only to an act of omission or neglect on the part of the Trustees to supply the water, and not to a case where circumstances over which they had no control prevented delivery of the supply. Mr. William Davis, the Secretary of the Company, was examined on their behalf, and proved that the drought during the autumn of 1893 affected the water in the lake to an extent that prevented the Trustees from supplying the required quantity after providing for the preferential supply to the town of Newry, which the Trustees were bound to give. It was stated that the question of law had been determined by Mr. Justice Holmes on the hearing of a civil bill appeal in 1888. Mr. Justice Gibson was of opinion that the non-supply of water during the greater part of the autumn of 1893 was due to *vis major*, and that during the rest of the time it was a reasonable thing on the part of the Trustees to curtail the supply in the apprehension that there would not be sufficient water for Newry. But as the question of law was a difficult one, and it being stated that Mr. Justice Holmes had already determined it, he entered judgment for the defendants, leaving it to the plaintiffs to move the Divisional Court to have the judgment entered for them.

Gas Lime and Insect Pests in Land.—A report has been presented to the Staffordshire Agricultural Society in regard to the remedial effects of gas lime when applied to land where insect pests have hitherto seriously interfered with farming crops. Mr. Edwin Bourne, on whose farm at Dorrington the annual ploughing-match was held, states that he has used hundreds of tons of gas lime on his land. The farm land in question was to a great extent of a light sandy nature; and though deep in soil and in good condition, the insect pest was so prevalent that it would scarcely grow a turnip on account of "finger and toe." Since gas lime has been used, the evil has vanished. In another part of the farm, gas lime was equally efficacious in eradicating wire worm, which had previously seriously affected every crop grown on it; and consequently Mr. Bourne speaks very highly of dressings of this material, and recommends its use wherever the land is subject to such pests.

The Quality of Bolton Gas.—At the monthly meeting of the Bolton Town Council last Wednesday week, Alderman Miles, the Chairman of the Gas Committee, replied to some criticisms which had been made as to the quality of the Corporation gas. He declared at the outset that the gas was not bad in illuminating power, nor vitiated by any overdose of impurities. Until 1887, the average power was about 17 candles. But in May of that year, a resolution was passed by the Gas Committee authorizing the Engineer to make it 18 candles; and from that time they had striven to raise it to this figure. During last year, the average was 18 candles. The question of sulphur was a rather serious one. He could take the members to a large town where they had regularly 30, 35, and 40 grains of sulphur per 100 cubic feet of gas; whereas at Bolton the average for the last three months had been 13·15 grains. In London, during the winter season, the gas was permitted to contain 22 grains of sulphur per 100 cubic feet. The chief reason for the complaints about the quality of the gas lay with the burners the consumers used. Mr. A. H. Taylor said that within the last twelve months the quantity of sulphur in the gas at one time was so great that doubt was thrown on the accuracy of the reports submitted by the analyst; and it was therefore decided to have an independent test of the gas. That analysis certainly showed there was less sulphur than was thought to be the case. Alderman Miles admitted that at one time during the past year the sulphur was excessive; but he should like to say that they had the same system of purification then as now. It was somewhat singular that, when they had a separate test made, the reports of sulphur diminished very quickly indeed.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Half-Yearly and Wharncliffe Meetings.

The Ordinary Half-Yearly General Meeting of the proprietors in this Company was held at the Bridge House Hotel, London Bridge, last Wednesday—Mr. GEORGE LIVESEY presiding.

The SECRETARY (Mr. Frank Bush) read the notice calling the meeting, and the minutes of the last meeting; and the seal was affixed to the register of shareholders.

The CHAIRMAN, in moving the adoption of the report and accounts, stated that there was a little mistake in the wording of the second paragraph. It stated that "the new contracts for coal have been made" (it ought to have been "were made last year") "at an average reduction of 6d. per ton." They had the new contracts to make; and although their friends on the other side of the water had again inserted a clause prohibiting coalowners from selling to the Company in 1896 at lower prices than they sold to their friends in 1895, he thought it very likely that they would circumvent this prohibition, as they had done before, and get their coal cheaper than their friends had done, after all. The further part of this paragraph related to products; but he need not take up their time in this matter, because there was a full explanation given of the circumstances in the paragraph itself. He thought they might now say that they had "touched bottom," certainly with respect to sulphate, and perhaps with respect to coke—at all events he hoped so as far as they were concerned. The third paragraph was an important and interesting one. It spoke of a satisfactory increase of 7·88 per cent. in the quantity of gas sold over the corresponding period of the previous year. About half of this increase was due to the automatic or penny-in-the-slot meters, whereby they were enabled to supply large numbers—now about 43,000—of the working classes with gas. While on this point, he might state how it was that they paid for this. In the accounts, they would see in the new capital expenditure in the half year that as much as £52,000 had been expended on new meters and stoves; most of it having been to supply the working classes with automatic meters, of which 10,616 were fixed in the half year, and cooking-stoves. In addition to this, they had put the fittings into the houses of these consumers. The net charge for meters and stoves was debited to capital without any depreciation; and this was quite right and proper. Stoves and meters might be removed—and they would be removed if they were not wanted; and so far they were movable property of the Company; but the pipes and fittings which were put into these small houses he did not think would be worth removing, even if they ceased to be used for gas supply. With respect to this item, half year by half year they charged so much to revenue—the labour; and they carried the balance to a suspense account, to be liquidated by the yearly payment in excess of the price for gas. They charged these working people a higher price than the ordinary consumers, because the price to the former included rent of meter and stoves, and rent and depreciation of gas-fittings. In their balance-sheet, there was an item of £30,881 balance due for automatic gas-fittings. That compared very favourably with the item in the accounts of their friends. The latter had £154,000 carried to suspense for 30,000 consumers; while the South Metropolitan had only £31,000 for 43,000 consumers. He thought therefore they might say that the Company were on a tolerably sound footing in this matter; and the amount he had mentioned in their balance-sheet was being regularly reduced half year by half year. The growth in their business was helping them to sell gas cheaper. Such an increase was of no use whatever unless it enabled them to do this; and in addition to this means—their increased business—of reducing their price, they were also adopting various economies. For instance, their cost for carbonizing had been reduced to 2s. 4½d. per ton of coal. The cost had been very much higher; but it had been partly reduced by the introduction of machinery and the willingness of their men to work it. They were also making economies in capital. They had recently issued to consumers another £30,000 of ordinary stock; and their new capital, taking share and debenture stock together, was really costing them well under 4 per cent. The effect during the last ten years of their various economies had been to enable them, on the point of capital alone, to reduce their price 3½d. per 1000 feet. It cost them now only 10d. to pay 13 per cent. dividend and interest on debenture stock; whereas ten years ago, it cost them 13½d. In these years they had increased their capital by £964,000; but they had increased their consumption of coal 305,000 tons, so that the capital bore about the proportion of £3 per ton of coal. It was by this means—economy of capital—that they were able to help in reducing the price; and the process was still going on. In 1894, the amount of their capital was £4 11s. 9d. per ton of coal used; while in 1895, it was £4 5s. 6d. He now came to the seventh paragraph of the report, which spoke of the employees of the Company. The Directors did not feel that it would be right on any occasion to pass over the good and loyal spirit in which the employees of all ranks performed their duties. They had shown their confidence in the Company by investing their savings in it; and the majority of them were trying to promote its interests. He believed that by all working loyally together—the Directors and employees of all ranks—they were also materially assisted in reducing the price of gas, which benefited employees, shareholders, and consumers alike. The dividend that was recommended was, as usual, the nominal 13 per cent., less £500—a fraction due to the "A" stock, but which had not been paid. This was the absolute property of the "A" stockholders, though they had hitherto given it up—actuated, he believed, by a generous spirit; and he thought they might ask them to give it up again, as later on he would explain why he believed it would help them with their Bill. He had said the dividend of 13 per cent. was nominal. As they were aware, since 1876 all new capital had been raised by auction; and consequently, although the dividend was called nominally 13 per cent., it was actually only about 4 per cent. He received a letter the other day from one of their consumers, to whom they had sent their circular offering the new stock; and the writer said: "Having £200 which I was about to re-invest, I feel very much inclined to take advantage of your invitation to apply for your "C" stock. I have often thought of doing so when receiving your circular; but it takes a bold man to give £320 for £100 of stock." That, however, was the figure at which that stock was issued, and it was the then market price of the day; because, let them remember, it would receive no dividend, whereas the quotation in the market was with the dividend accrued. Speaking of the dividend, they proposed to add the odd ¾ per cent. dividend to the reserve fund. They were now selling gas at 2s. 3d., and they were paying a dividend on 2s. 6d.; and it was unreasonable to expect that shareholders would be contented with less dividend than they were entitled to. Last half year the amount given up was only ¼ per cent. But in consequence of the further reduction of 1d., since it was ¾ per cent. this time; and the reason they asked the shareholders to give that up, was to enable the Directors to build up the reserve fund. This fund was seriously depleted some time back—not so much because of the strike as of the high price of coal; and the fact that they had so large a reserve fund, prevented them from increasing the price as soon as they afterwards thought they should have done. They delayed it until Septmber, 1891. If they had not had a large reserve fund, they would have raised it sooner, and the public would have been content. He therefore thought that a very large reserve was a disadvantage. A reserve fund was not wanted so much to make up dividends as to meet extraordinary expenses or accidental circumstances. If coal rose in price, the public were willing to pay a small addition in their gas bills. They thought that this would be their policy in the future, although they did not see any prospect at present of the price of coal rising. They were adding the ¾ per cent. mentioned to the reserve fund, which would then stand at about £83,500—it being now £74,500. They had not made sufficient profit to carry this amount to the reserve fund; but they had an undivided balance brought forward. Their profit was not quite enough to pay 13 per cent.; it was £6750 short. This, however, was a very small amount—less than ¼d. per 1000 feet; and considering that they had reduced the price in the half year, and had had to meet losses on coke and other things, they thought it was very satisfactory that the deficiency was so small. They took an additional £8000 odd from the undivided balance for the purpose of adding it to the reserve fund, because that was the only way in which they could increase this fund; and they thought that the amount was better in the reserve fund than in the undivided balance. They had endeavoured to settle the rating with the various parishes; and most of the parishes had met the Company in a fair spirit. But there were some which would not do so. There were some men, indeed, who could not be fair. They were under the necessity, therefore, of appealing to Quarter Sessions. It seemed impossible for the public authorities to understand that Gas Companies and the public were partners; they still retained the old idea that they must be enemies. To give an idea, however, of the net result of this partnership since the sliding-scale was introduced twenty years ago, he might state that the average price of gas in South London at that date was 3s. 4d. per 1000 cubic feet, whereas it was now only 2s. 3d. The difference of 1s. 1d. per 1000 feet to the consumer in one year was £416,000—that was, they were paying £416,000 less per annum for their gas now than they would have done if the price had been what it was when the sliding-scale was introduced. What, however, had the shareholders received? They had as yet got an addition of 3 per cent. to their dividend, which amounted to £65,000. Therefore, to get this extra £65,000 for the shareholders, the consumers had received, and were receiving, year by year £416,000. He was not aware of anything else in the report to which to draw attention.

Mr. J. EWART, in seconding the motion, observed that they had had, perhaps, one or two better reports than that which was submitted on the present occasion; but, on the other hand, they had presented many which were worse. Moreover, if any shareholder would go into the facts contained in the accounts, he would find that the position of the Company, in fact, was stronger than it appeared to be.

Dr. DRYSDALE, referring to the savings of the workmen, said he believed that £25,000 was in shares of the Company. He expressed great pleasure at hearing the admirable account which the Chairman had given them of the Company's affairs, and he thought this was to a certain extent attributable to their profit-sharing scheme. As Mr. Livesey was the first person to commence this system, and as theirs was the first gas company to do so, he believed they ought to lay great stress on the point; because he believed that the South Metropolitan Company was on a much better footing than other companies were on this account. He thought the Chairman was quite right in saying that a large reserve fund was a bad thing. He had proved it to be so with other concerns. He had known banks to do very well until they got very large reserve funds; and then the managers began to be careless in advancing money, and in doing other very foolish things.

Mr. HOBSON (Sheffield) stated that he attended the present meeting as representing a family interest in the Company extending over a period approaching 30 years. As a rule his family—his father before him had done so—supported the policy of the Company; and they trusted that they would do so in the future. But he must say that he criticized very strongly the policy the Directors had taken, more especially with reference to the point of wishing to promote a Bill to authorize the appointment of workmen-directors. He did not consider such a proposal as this was in the interest of the shareholders of the Company.

The CHAIRMAN remarked that this question had nothing whatever to do with the report; but Mr. Hobson would have the fullest opportunity of discussing it at the Wharncliffe meeting. The question would not be shirked in any way whatever by the Directors.

Mr. HOBSON (continuing) stated that, on this understanding, he would reserve his remarks on the point. There were, however, one or two other observations which he desired to make on the report. He wanted, first, to know why one of the Directors—Mr. Leigh Smith—had resigned. He did not know whether this gentleman was present, or would offer any explanation as to his action; but he thought the shareholders were entitled to be informed whether Mr. Smith had resigned his position because he disapproved of the policy of the Board.

They understood some time ago that some of the Directors did not agree with the policy advocated by the Chairman; and, as an independent shareholder, he desired to thank those Directors for their action. He wished they had gone further, and had set forth in a report what their views were, and taken a vote of the shareholders against Mr. Livesey. Not that he did not support Mr. Livesey in many things which that gentleman did; but he maintained that the shareholders were entitled to know who the Directors were who had disapproved of the Chairman's policy. With respect to the reduction in the price of gas from 2s. 4d. to 2s. 3d., the matter would probably be handled—he trusted it would—by shareholders who had gone into the figures more carefully than he had had the opportunity or time to do; but it appeared to him that this reduction had been rather made with the view of favouring the "A" shareholders in preference to the "B" shareholders in connection with the proposed conversion. [A Voice: Nonsense.] Well, that was how it appeared to him. The interest he represented was more largely in the "A" than the "B" stock; and therefore he maintained that he could not be accused of speaking otherwise than impartially on the matter.

Mr. Simpson inquired by what authority the Directors had invested the £11,000, or thereabouts, which the "A" shareholders were entitled to in "A" stock.

The Chairman, in reply, said he would answer the last point first. Nothing about it appeared in the report; and he did not know how Mr. Simpson was aware that it was so invested. But the Directors thought it a proper thing to do, seeing that it was money which belonged to the "A" shareholders. It was on this ground that they had thought it right to invest it in "A" stock. It was done, no doubt, with a purpose; and being so invested, it would facilitate the question of the commutation of the "A" and "B" stocks when the Bill was in Parliament. In reference to Dr. Drysdale's remarks, it was perfectly true that the employees had invested £25,624 in the stock of the Company; and they also held £33,227 on deposit belonging to their workmen. They allowed them to leave their annual bonus in the Company's hands at 4 per cent. This money could be drawn at any time; but nearly half of the men left their portion in the Company's hands every year. This was good evidence both of the confidence of the employees in the Company and of their thrift. With reference to the question why Mr. Benjamin Leigh Smith had resigned his seat on the Board, it was very difficult to explain the motives of another man; they might be mixed. It was not for him to say why Mr. Smith had resigned. One reason might be that he did not care to attend the Board meetings. On one occasion, during the winter of 1894-95, Mr. Smith was absent close upon six months, only attending two or three Board meetings. He did not care for the work, and wished to be free. He believed—he would be perfectly frank in the matter—that Mr. Smith did object to workman-directors; but he (the Chairman) was not in a position to say that this was the only reason why that gentleman had resigned. He would be quite prepared to deal with the question of workman-directors when the time came for doing so; but meanwhile he would only say that he had had more experience in this matter than Mr. Hobson. With respect to the reduction of price, he did not think it was right of Mr. Hobson to impute motives or give utterance to insinuations. Their Company had always followed the policy of reducing the price whenever they were able to do so. Last June, they found themselves with a considerable surplus in hand; and the only course open to them was to reduce the price. So far from the insinuations of Mr. Hobson being correct, that very fact made the Directors hesitate about reducing the price. They said that if the price was lowered, it might affect the question of the commutation of the "A" and "B" stocks, and on this ground it would be better not to reduce the price. They were not, however, going to depart, for any reason whatever, from their policy of reducing the price whenever they could do so.

The resolution was then put, and declared carried with one dissentient—Mr. Hobson.

On the motion of the Deputy-Chairman (Captain T. B. Heathorn, R.A.), seconded by Mr. Simpson Rostron, the following resolution was afterwards passed: "That a dividend at the rate of 13 per cent. per annum be now declared, and that such dividend, with the exception of the sum of £500, be apportioned amongst the three classes of stock as prescribed by the Scheme of Amalgamation, 1880; and that the warrants be transmitted to the registered addresses of the proprietors by post."

The Chairman having vacated the chair,

The Deputy-Chairman stated that Mr. Livesey now went out of office by rotation; but he felt sure the shareholders desired to see him occupy the chair again as speedily as possible, and he would therefore simply propose his re-election.

Mr. Simpson Rostron briefly expressed his great pleasure in seconding the motion, which, on being put to the meeting, was carried unanimously amid general cheers.

Mr. Livesey, having resumed the chair, cordially thanked the shareholders for their renewed expression of confidence in him. He assured them that he was very proud of the position in which they had placed him. He had given his life so far to the work of the Company; and whatever remained of it should still be devoted to them so long as he was able. He afterwards proposed the re-election of Mr. Edward Cardwell. That gentleman, he said, was not present that day; but this fact enabled him to speak more freely about his colleague. Since Mr. Cardwell was elected a Director, no man had attended to the duties of his office more faithfully and earnestly than he had done; and no one had brought a more intelligent interest to bear on the welfare of the Company than had Mr. Cardwell. He was not present at the meeting because he felt—his colleague had told him this—that he was to some extent in opposition to the wishes of the shareholders. They would remember that at the last meeting they carried practically unanimously a resolution approving the workman-director question. Mr. Cardwell was one of his colleagues who fairly and honourably dissented from him in that matter; but he had told him (the Chairman) that what occurred at the last meeting was the will of the shareholders, and he therefore did not like to appear before them again in an antagonistic position. In reply, he said: "Mr. Cardwell, I want you re-elected for that very reason more than for any other. It is not well that I or any man should have his views carried out without fair and honest criticism. You will be able to put a brake on; and I should be very glad personally to have you with us on that ground as well as on other grounds, because you did not see eye to eye with me." Mr. Cardwell, however, he believed, saw eye to eye with the Directors on all other questions, and he had much pleasure in proposing his re-election.

Mr. Stocks seconded the motion, remarking that he did so mainly on account of what the Chairman had said; believing, as he did, that it was well for some Director to be a little in opposition to views which might be expressed by a majority of the Board.

The motion was carried unanimously; and subsequently Mr. George Maughan Footner was re-elected an Auditor of the Company.

The Wharncliffe meeting was afterwards held.

The Secretary having read the notice calling the meeting,

The Solicitor (Mr. Blyth) read and explained the heads of the Bill which it was proposed to submit to Parliament; reading *in extenso* clause 21, which related to the representation of employees in the management of the Company. It was as follows:—

(1) At any such time after the total investments of the employees of the Company in the ordinary stock of the Company dating from the distribution of the first profit-sharing bonus in July one thousand eight hundred and ninety shall exceed the nominal amount of forty thousand pounds of such stock, the Directors of the Company may, as and when they deem expedient, prepare a scheme for the purpose of enabling employees holding ordinary stock of the Company to elect one or more of their number, but not exceeding three, to take part with the Directors in the management of the Company.

(2) The scheme shall be submitted to a special general meeting of the Company, duly called with notice of the business to be considered thereat; and the meeting may adopt the scheme, either without alteration or with such alterations (not being inconsistent with the provisions of this Act) as the Directors may assent to.

(3) The scheme so adopted shall be submitted for the approval of the Board of Trade; and that Board may consider the same, and may either approve the same without alteration, or may suggest any alterations therein not being inconsistent with the provisions of this Act, and if the Directors assent to the alterations (if any) so suggested the Board of Trade may approve the scheme as altered.

(4) The scheme, when approved, shall be published in the "London Gazette," and (subject as hereinafter provided) shall for the period of three years, and no longer, from the date of such publication have effect. Provided that if at any time during that period the amount of the investment of the employees in the stock of the Company should fall below the nominal amount of forty thousand pounds, the scheme shall cease to be in force.

(5) On the cesser of such scheme, and subject to the provisions of this Act and to the like submission, adoption, and approval, a new scheme may at any time be adopted for any period that may be in that scheme prescribed, and so from time to time.

(6) The qualification of an employees' director shall be fixed by the scheme for the time being, subject to the following limitations: The employees' director shall have been not less than seven years in the constant employ of the Company, and shall have held for not less than twelve months prior to the date of election, and shall hold, not less than eighty pounds nominal value of the ordinary stock of the Company; and he shall become disqualified if and when he ceases from any cause to be in the employ of the Company or to hold the said amount of stock.

(7) The fees to be paid to an employees' director for his attendance at the Board shall be fixed by the scheme. The fees shall bear some proportion (to be fixed by the scheme) to the amount of the qualification, not being less than his ordinary day's pay nor more than four times that amount. He shall perform his ordinary duty except on Board day.

(8) The scale and method of voting for, and the mode of election of, employees' directors, and all other details, shall be settled by the scheme, and may be varied by successive schemes from time to time.

The Chairman said that the resolution he had to move was: "That the Bill now submitted to the meeting, intituled 'A Bill to convert the capital of the South Metropolitan Gas Company, and for other purposes,' be, and the same is, hereby approved, subject to any amendments which may be made therein by Parliament and approved by the Directors." In proposing the resolution, it was necessary, in addition to their having heard the heads of the Bill read, that he should make a few remarks. The main object of the Bill was to convert the capital into a larger amount bearing a lower rate of dividend, in order that the market price and the nominal price should very nearly correspond. The letter from which he had just quoted from one of their consumers, who said it required a bold man to give £320 for £100 of stock, applied with great force in this matter; seeing that the whole of the Company's capital had now to be raised by auction under the auction clauses. He might incidentally mention that of the £3,500,000 of capital they now possessed, more than £1,500,000 had been so raised; and therefore they were getting on to half of their capital being auction capital, and that which was ordinary stock bore a nominally high rate of dividend, which, however, was altogether fallacious—the real rate being 4 per cent. Why had they altered 5 per cent. in last year's proposal to 4 per cent.? Simply because there had been in the interval a great change in the market price of the stock; and the very reason which induced them to suggest 5 per cent. last year was that which made them now suggest 4 per cent. Whereas eighteen months ago, gas stock could be bought in the market to pay 5 per cent., it could only be obtained now to pay 4 per cent.; and that was the reason for the present proposal. There was another reason why they suggested the splitting of the stock. It was of no use going to Parliament for any purpose, unless it could be shown to be to the public advantage; and it was to the public advantage and to the Company's advantage—they were partners here again—that all their new capital should be raised at the lowest possible rate of interest. If gas capital was ticketed, so to speak, as 4 per cent. stock, the probability was that it would be more likely to realize a price corresponding to 4 per cent. than if it were ticketed as a 5 per cent. stock. They therefore thought that, in going for a conversion at 4 per cent., they ought to have the public authorities with them, because the proposal was for the public advantage. That simply referred to the conversion of the stock; and he believed that so far as this matter was concerned, there had never been a dissentient note among them. Everyone at the meeting last year and now was agreed that this was an advisable step; and it was a just step, on the ground

of the auction clause. With regard to their debenture stock, it had been raised by auction or by tender. It was 5 per cent. stock; and the last issue was at 172½. It would look rather bad if the ordinary stock were at a standard rate of 4 per cent. and the debenture stock was 5 per cent. It would seem, to people who did not understand the matter, as if the credit of the Company were not quite as it should be, if they had ordinary stock at a 4 per cent. standard and debenture stock at 5 per cent. They therefore thought it advisable to ask for power to convert their debenture stock, probably into a 3 per cent. stock. To that, there could be no objection. It had been done in numbers of cases by public companies and authorities; and it would no doubt pass without any question at all. He would leave the question of the commutation of the "A" and the "B" stocks until the last, because this was the point on which he expected most would have to be said. One other object of the Bill was to enable the Company to offer their stock to the consumers and their workmen at market rates. This had been allowed by the Board of Trade; and the Secretary of that Department had last year given evidence in favour of it. Sir John Hutton in 1894 made the statement that it would be a good thing if public bodies and public companies would give facilities to small investors to buy their stocks. Their Company had adopted this system. Instead of putting their stock on the market for brokers to take up in large sums to resell at a profit, they had offered it to their consumers, limiting the amount to £300; but the average investment was only about £50 or £60. Any man with £16 might buy £5 of the stock. It was proposed to take this power in the Bill. By making the consumer a partner in this matter also, they were tending to make their customers their friends. At the time of the strike, it was said that the Company had their consumers with them; and rather a shrewd newspaper remarked that if the Company got the consumers to be shareholders also, they would have the latter with them in the future in a double sense. As to the knotty point of workman-directors, he had the great pleasure of knowing Mr. Hobson's father; and they were good friends—as, he hoped, Mr. Hobson and himself also would be good friends before they had done. He did not think that Mr. Hobson understood the question of workman-directors; but it was thoroughly discussed at their last meeting. Some of his (the Chairman's) colleagues did not agree with him in this matter; but he claimed to have had rather a larger experience than most men in dealing with workmen. There were two courses open to them. Employers could hold their workmen at arm's length; and then there were two hostile camps. They had the trades union on one side, and the employer on the other, each fighting against the other without any mutuality whatever. They had themselves had six months' concentrated experience of trade unionism. Its whole tone was still antagonistic to capital and employers. If they read the reports of the trades union congresses, they would find one predominating note—hostility towards employers, who were spoken of as "the enemy." They had to choose between distrust of their employees and treating them with confidence. The only question that could arise was, Would the workpeople respond to the confidence shown in them? They said to the men under the pressure of the union that they would introduce the profit-sharing system, and that they would give them a bonus. This was done for the purpose of attaching the men to them. They also told the men that they could withdraw this money or leave it with the Company; but nearly half of them had trusted the Directors with their money. When a workman trusted his employers with his money, he gave the highest proof of confidence which he could bestow. The Directors afterwards went further, and said: "We wish you to be shareholders. We do not want to act simply as a savings bank to you, holding your money on deposit. Will you trust your money with the Company?" To their great gratification—and he was now expressing the unanimous feeling of the Board—the men responded, and in a very remarkable manner, until now there was £25,000 of their money invested in the Company. The investment of these people's money was more to them than it was to the ordinary shareholder. The ordinary shareholder did not put all his "eggs in one basket," however good it might be; but with respect to these people—in the presence of many of whom he was at that moment speaking—their investment in the Company was all that they had. Probably that was the case with regard to most of them. They had trusted the Company to this extent; and that being so, he maintained that if confidence was to beget confidence, the right thing was to trust their men—and he was not afraid of doing so—with a share in the management. What they did at the strike was destructive. They fought the union, and beat it. That was not much to be proud of, if it were all. But they then entered upon a constructive policy; and what he believed most thoroughly was that, by trusting their people and getting them to unite with them, the Company would be in a stronger position than they had ever been, and stronger than that of any company not based on so broad a foundation. He told the shareholders plainly that they had to choose—that employers had to choose—between either antagonism of trade unions or the union with their workpeople, with all that it involved. The proposal was, he thought, sufficiently safeguarded. If the workmen did not respond, if they did not act properly, the thing would drop in three years. The shareholders must also remember that the Bill could not be presented to Parliament without this feature being included in it. They would have some difficulty in carrying it as it was; but this matter was a sort of make-weight. The Duke of Devonshire, Sir Michael Hicks-Beach, and Mr. Mundella had all expressed their sympathy with the proposal; and if it were struck out they would lose this sympathy. With regard to the other knotty point—namely, the question of the commutation of the "A" and "B" stocks—he could not understand Mr. Hobson saying that the proposed terms were to the disadvantage of the "B" stockholders, because they were identical with those of last year. It was proposed then that there should be a 5 per cent. stock; and the "B" stockholder was to have £186 of it for £100 of ordinary stock. Converting that into 4 per cent., would mean £232 10s.; that being the equivalent of £186 of 5 per cent. stock. But the "A" stockholder would get a little more. He desired at this point to state that last year a very hard bargain was driven with the "A" stockholders, who were asked—and, for the sake of peace, they generously agreed—to accept less than would give them the dividend they had been receiving. The Directors, however, felt on this occasion that they could not ask them to take less stock than would be sufficient to give them the same dividend as they were now receiving. They thought that the "A" stockholders should have a little more. There had been a pile of correspondence on the subject; and the result had been that a compromise had been been offered by the Board, which was set out in the circular issued on the 1st inst.* It was now proposed that the "A" stockholders should have £299 of new stock, which would give them the equivalent of £15 10s. 11½d., on the basis of a 13 per cent. dividend; and the "B" stockholders were to receive £232 10s. of new stock, which would give them £12 1s. 9½d. If he could have the "A" stockholders in one room and the "B" stockholders in another, he would probably be able to do better with them—that was, if there was any disposition among them to be unreasonable. He could not, however, meet them separately; but he was happy to think that the shareholders were disposed to be fair and reasonable. They had had assents to this proposal representing nearly half the "A" stock and nearly half the "B" stock. That was a very large proportion of assents; and they had received no dissents. There were two shareholders, however, who did not like the proposal. One gentleman wrote from Edinburgh dissenting from it; but he (the Chairman) replied, whereupon this gentleman telegraphed withdrawing his dissent. They now came to the shareholders in this position—that they had not a single dissentient. Those who had replied had all assented. He ought to say that the £299 which was proposed to be given to the "A" stockholders was not made up by taking anything from the "B" stockholders. If the "A" stockholders were to have the exact equivalent of the hard terms of last year, they would receive £297 5s. But the Directors found that in the last 15 years there had been certain fractions of dividend not paid to them—fractions they were perfectly entitled to, and which he believed the Company would have to pay if any "A" shareholder demanded it. If the "B" stockholders got 12 per cent. the "A" stockholders were entitled to, and could demand, £15 14s. per cent. But they had given up the odd amount, which came to £1000 a year. The Directors had invested this amount in "A" stock; and they proposed to ask Parliament, instead of dividing it among the "A" stockholders, to let it be apportioned in the division of the proposed new stock. The effect of this would be to give the "A" holder £299, instead of £297 5s., of new stock for £100 of ordinary stock. This would give him £15 10s. 11½d. per cent. on the present rate; and the "B's" would get £12 1s. 9½d. per cent.—that was to say, the "A's" would get 11d. per cent. more, and the "B's" 1s. 9½d. per cent. more out of the surplus. They had gone into the matter thoroughly, and had debated it endlessly with those two shareholders. It had all been about a mere trifle—a few pence or shillings at the most; and they had come to the conclusion that these were the best terms that could be obtained for both sides. The Board represented both the "A" and the "B" stocks. But whatever they might be as regarded other points, the Directors were perfectly unanimous in this matter; and, as they could see, the whole Board had signed the circular. They had been justified, he held, in this unanimity by the result of the circular; and therefore what he now had to ask the meeting was to approve the arrangement. Last year they had a unanimous vote. It was true that one hand was held up against the proposal then submitted; but they believed that this was a mistake, and they could never find out whose hand it was. He hoped that on the present occasion there would also be a unanimous vote. He might conclude with a little anecdote, in illustration of what he had been saying. Two years ago he was visiting with a friend a piece of land on which the latter was building a house. A Colonel of Engineers was with them. At one point, there was a boundary crossing a piece of marshy land by the side of the river. His friend stated that there was a little question about this boundary, on which the Colonel observed: "There are some people who when property is in question will fight about the tip of a pheasant's tail." He hoped that there were no such gentlemen at the present meeting.

Mr. HARRIS stated that the proposal was to give to the "B" stockholders exactly the same amount as was offered last year, and to the "A" stockholders also; but, in addition, to give to the "A" holders so much new stock as would give them £299, in the way the Chairman proposed. He assumed, however, that this would depend on Parliament giving its approval.

The CHAIRMAN assented.

Mr. HARRIS said that the proposal could only be carried out if it was not opposed by the "B" stockholders, because the money which was to be used to make up the £299 to be given to the "A's" formed part of the reserve fund.

The CHAIRMAN: The "B" stockholders have nothing to do with it; this money has not been carried to the reserve fund.

Mr. HARRIS stated that he was quoting the clause of the Bill.

The CHAIRMAN: It has never belonged to the reserve fund.

Mr. HARRIS said that he desired to ask whether the "B's" would suffer in the event of what was proposed not being carried out so far as regarded the "A" stock. If he were assured that the "B" stockholders would receive under any circumstances the same amount as was offered to them last year, he was quite contented that the "A's" should receive what was now proposed to be given to them, if that could be done. If he could be assured of this, his opposition would be removed.

Mr. ROBERT MORTON at this point seconded the resolution.

Mr. FOSTER said that perhaps he was the oldest shareholder in the room; and he had studied the matter very carefully. He thought that the Directors had managed to hit just the right medium between the "A's" and the "B's." They could not deal with the future as regarded the price of their gas; What they had to do was to deal with the present moment; and the calculations ubmitted to them were based upon that. He held mostly "A" stock; and he considered that the Chairman, and those who had worked out the proposal with him, had done the best they could for the shareholders. If they could carry out the proposed arrangement, he believed that

* The principal portions of the circular appeared in the last issue of the "JOURNAL."

they would see their stock rise considerably in price. He then handed in seven more assents to the scheme.

Mr. HARRIS said he had hoped it would be unnecessary for him to continue with the remarks he was now about to address to the meeting. On the last occasion, they came to an arrangement by which the "A" and the "B" stockholders were perfectly in harmony. At the meeting last February, the Chairman stated that the bases of the terms proposed on that occasion were the only fair bases; and he (the speaker) supported the proposal, because he did not think the arrangement would be disturbed. He had, however, been greatly surprised when he was consulted on the matter about a month ago. The Chairman, in the course of his remarks, had stated that there were two large shareholders who dissented from what was now proposed; and this was true. They came and met the Chairman about a month since, supposing that they would be dealt with under the same arrangement as that proposed last year; but this was not the case.

A SHAREHOLDER remarked that the case was altered; the price was different.

Mr. HARRIS said he was aware that the price had been reduced by 1d.; but he maintained that there was no argument in that. The shareholders received a circular last year, and they had another one this year; and they would have been struck with some considerable differences which appeared in the two. After quoting from the circular of last year, he stated that after a good deal of negotiation, they were offered the compromise which the Chairman had mentioned. He did not object to the "A" stockholders receiving the amount in question from the reserve fund, or if it was not in the reserve fund; but could the "B" stockholders be assured that this proposal could be carried out, and if not would they be certain to receive what was now proposed to be apportioned to them? He was surprised to hear the Chairman say that he had not received a single dissent, because he (the speaker) thought that his colleague had written saying he could not consent unless this assurance was given.

The CHAIRMAN remarked that the gentleman in question stated that, unless a certain assurance could be given him, he could not assent to the Bill; but he did not dissent from it.

Mr. HARRIS said he agreed that the conversion was in the interest of every shareholder; but a scheme of commutation was not at all necessary, and it might be very hard on one class of shareholders. If the scheme of commutation were carried, it would be very largely in the interest of the "A" stockholders; but it would not profit the "B's" at all. He was considering not only the question of the yield, but also that of the market value. He had had from nine stockbrokers estmates of what the value of the stocks would be. For years past the "A" stock had commanded a price about 20 per cent.—not quite 20 per cent.—above that of the "B" stock; but since the scheme had been suggested, the "A" stock had gone up. Last year, when the matter first arose, there was an immediate advance in the "A" stock; and this had gone on ever since. That day the "A" stock was worth a little over 22 per cent. in excess of the "B." What was proposed under the scheme as an equitable arrangement was that the "A's" should receive an amount of stock 29 per cent. over that of the "B's." The reason of this was, he had no doubt, that there had been great difficulty in maintaining the very large dividend which the "A" stock had been receiving for some years past. If there was any probability that the "B's" could be put back, and the "A's" receive more than was offered them under the scheme of last year, he should dissent. A very little increase in the price of coal would shrink away the whole of the reserve fund; and it would be necessary to increase the price of the gas. Why had the harmony of last year been disturbed?

The CHAIRMAN: It is you who are disturbing it.

Mr. HARRIS dissented. The Chairman told them last year that the arrangement then submitted was on a fair and equitable basis; but now they were told that the "A" stockholders were to receive more than was then offered to them. He would, however, withdraw his dissent if he were assured that, if the "A's" failed in getting what was proposed to be given to them from the reserve fund, they would not endeavour to get it out of the "B's."

Mr. SIMPSON said that the amount invested in "A" stock belonged simply to the holders of that stock. It had been withheld from them by *force majeure*.

The CHAIRMAN: No, willingly. They all assented to it. The present "A" dividend seemed to him to be secured pretty well by a sum of 3d. per 1000 feet on the price of gas, this representing £90,000.

Mr. SIMPSON said that the question of the bargain appeared to be this—that the "A" stockholders gave up certain rights, and a probable increase of dividend, in consideration of getting a certain amount of capital. That was further complicated by the fact that the price of the "A" and the "B" stocks, taken separately, was better than that of the "C." It seemed to him that the "A" stockholders had to suffer in revenue, and the "B's" in capital.

The CHAIRMAN stated that the "B" stockholders would not lose in capital.

Mr. SIMPSON thought it would have been wiser if the scheme had been drawn upon the lines followed by railway companies—that was, divide the stock into an equal amount of preferred and deferred.

Mr. HOBSON said he represented both the "A" and the "B" stockholders; and very nearly in equal amount. The Chairman was perfectly correct in saying that he had had a great deal more to do with the management of workmen than he (the speaker) had. But his father and grandfather had been connected with gas companies and occupied seats on the boards of those companies, and he was himself an employer of labour; so that he had some little experience in dealing with workmen. One of the main arguments advanced by the Chairman with respect to the Bill—and he thought it was a very strong one—was that it did away with different classes and different interests of shareholders; and that it did away, possibly, at some future time with a cause of quarrel between the "A" and "B" stockholders. He agreed with the Chairman to a considerable extent, that it was very desirable that the Company should not have divergent interests; and the main objection he had to the Chairman's scheme was that it proceeded to create a class of shareholders who would have undue privileges, because, when the workmen had a certain amount of stock, they could have a representative—in fact, three representatives—on the Board; and this was a privilege which no other class of shareholders could have. If he or any other shareholder wished to become a Director, he must hold £5000 of the new stock; but the privileged shareholder, under the Bill, might become a Director if he had £80 of stock.

The CHAIRMAN said it was to be at least £100 market value.

Mr. HOBSON (continuing) stated that the Chairman might remark that £100 to a workman was quite as important as £6000 was to a capitalist; but it must be remembered also that £100 interest of the workman was a mere nothing, as anyone knew, to a trades union or organization of that character, which could easily provide the money.

The CHAIRMAN: But our men have nothing to do with trades unions.

Mr. HOBSON said that he wished they had to a certain extent, because he believed that a reasonably conducted trade union was of benefit to employers. He maintained that the interests of a workman as a shareholder could be represented on the Board without the necessity of having a director of his own class; and the interests of the workman were, he added, almost certain to be antagonistic to those of the shareholders.

The CHAIRMAN: There you do not know as much as we do. Our men are not antagonistic to us. Some of them are present, and can answer for themselves.

Mr. HOBSON contended that the workman-director could not possibly be a free and independent agent. One day he would be attending a Board meeting as a director, and the next day he would be attending to his work as an employee of the Company; and he would be either a dummy workman or a dummy director. The Chairman said it was necessary to put this feature in the Bill as a kind of sop to Cerberus, with the view of placating the opposition presumably of the London County Council or of Parliament. For his own part, however, he did not think it was at all necessary to put it in the Bill, because similar schemes of conversion of stock had been carried by many of the railway companies. In none of these cases had it been found necessary, in order to obtain the assent of Parliament, to insert the project of workman-directors; and why should it be necessary in the case of this Company?

The CHAIRMAN pointed out that the proposal was amply safeguarded; and if it did not answer, it would fall through in three years.

Mr. HOBSON maintained that, in case any difficulty arose with the Board, it would be practically impossible for the workman-director to be loyal to both parties—to the Board and to those he represented at the Board. As to safeguards, the very fact that Mr. Livesey had thought it necessary to provide safeguards ought to be a warning to the shareholders of the unwisdom of the proposal. At present they were represented by Mr. Livesey, who was a very strong Chairman. He perfectly admitted the able way in which Mr. Livesey had served them; but the shareholders might not always be represented by such a strong man as Mr. Livesey was. He therefore said that they ought to look ahead, and to the time when they might not have a man of Mr. Livesey's abilities; and possibly a dangerous time for them might then arise.

The CHAIRMAN, in answer to a question, stated that the representatives of the employees—that is, officers and workmen—on the Board would be in addition to the present members; and for this purpose the number of the Board would be raised to a maximum of ten ultimately.

Mr. HOBSON said he believed thoroughly in the profit-sharing scheme, and in obtaining the confidence of workmen; and he also thoroughly agreed in promoting good feeling between employers and workmen. He believed, however, that workmen liked to know who the master or the "boss" was; and he maintained that anyone who acted on Thursday as a director and on Friday as a working man, was holding two positions which were incompatible for any human being to fulfil properly. He thought that the shareholders had in a way hardly been treated quite fairly, because he did not believe that the two sides of the question had been put properly before the shareholders. In the scheme presented for the shareholders' approval last year, not a word was said as to the question of workman-directors.

The CHAIRMAN: We made a point of that at the meeting last August. It was laid before the meeting, which practically unanimously said that it was to be put in.

Mr. HOBSON maintained that if it was put to the meeting last August, it did not do away with his rights.

The CHAIRMAN: It does away with this—that you have no right to say you have not been fairly dealt by. We had a unanimous expression of feeling last August that it was to be put in this year; and it is put in. Every shareholder had a full report of the meeting last August, when the matter was discussed in the most complete manner; and if you did not read that report, it was your fault, not ours. That report said that this feature would be in the Bill. Answering a question of Mr. Hobson, the Chairman added that they were not allowed to send out stamped proxies for a Wharncliffe meeting; but as for the other, the Company would not pay for the stamps.

Mr. HOBSON asked whether the Chairman would be prepared to send out a circular to the shareholders dealing simply with the question of workman-directors, and pointing out the *pros* and *cons*—expressing the views of himself and those of his colleagues who dissented from him. Mr. Cardwell had felt it his duty to stop away from the meeting; and Mr. Shand did not find himself able to be present. He made his remarks in no captious spirit towards Mr. Livesey. He had simply honestly expressed his own views. Mr. Livesey must remember that he was elected a Director as an ultimate trustee for all the shareholders, and not for any one section. When Mr. Livesey found himself in a minority—as he (the speaker) understood he was—he thought it was their Chairman's duty, as a member of the Board, to allow the majority of the Board to rule him, and not to attempt to overrule the majority by a threat—or at least by saying that he would resign if the point was not conceded.

Mr. G. HOWLETT, who said he was a "B" shareholder, thought the proposal was a very fair one. The men they now had were a totally different class from those who caused the strike. They had invested their money in the Company; and he thought it was a right thing, if they had co-operation in a measure, to have it all round. He was convinced that the presence of a workman-director would not be any deterrent to the Board in doing their duty; and the Board would not prevent the workman-director from doing his duty. The remark that

Mr. Livesey was a strong man was quite correct; but if they built up the matter properly, it would not depend on Mr. Livesey.

Mr. HOGARTH said he thoroughly endorsed the remarks of the last speaker. By what Mr. Livesey had done, they were a company of hearts, minds, and actions, and were all working together for the common good. They were now being asked to consent to another step in the same direction; and he hoped that the request would be unanimously granted.

Mr. SODEN said he thought some of the speakers had lost sight of the principle which had guided the Directors—viz., what was for the public interest. This point had been kept clearly before the Board and the shareholders ever since Mr. Livesey got the sliding-scale passed. This created an identity of interests between the shareholders and the consumers; and in consequence of the strike which took place a few years ago, the introduction of the profit-sharing scheme brought a third partner into the Company. This was followed up by the proposal that the workman should be a shareholder—thus giving him an interest in the concern; and, so far as the Directors' present scheme was concerned, it seemed to him that it was the financial outcome of what had been approved by the shareholders from half year to half year. Moreover, the Bill could not come into force without the approval of the shareholders; and, after all, it was only a temporary matter. They must also remember what Mr. Livesey told them took place in Parliament last year; and there was no doubt that it would imperil the Bill if the shareholders did not assent to it as it stood. With respect to what the "A's" and "B's" were to have, he had given his consent to the proposed division of stock between them. He was an "A" shareholder; but he had some interest in the "B" capital also. Both classes of shares were entitled to an equal dividend up to 11 per cent. After that, "A" took out of "B's" pocket half his profit; and the question therefore as between the "A's" and "B's" was what was the value of that half. Whatever value was given to "A" must come out of "B's" pocket. He should be contented to remain as they were at present. But there was a greater interest than that of the shareholders, and that was the interest of the public; and they must bear in mind, as he said at a former meeting, it was a misfortune for the Company that the stockholders who had the greatest interest in reducing the price of the gas should have the smallest capital. It was in the consumers' interest that the "A's" and "B's" should be amalgamated; and it was of no use squabbling over a miserable shilling or so difference. If the scheme was carried out, their stock would go up in value, whether it was "A," "B," or "C."

The CHAIRMAN, in reply, at the close of the discussion, said that with regard to Mr. Hobson's remark about safeguards, there were safeguards with respect to ordinary shareholders. The one they proposed as to the workman-director, was that he should be seven years in the Company's service, and hold a certain amount of the Company's stock. Some years ago, he (the Chairman) went as far as profit-sharing; and he had since got beyond that. Mr. Hobson approved of profit-sharing; and he hoped that, in what the Directors now proposed, they would only be showing that gentleman how he might advance in the future. The conversion of their stock into preferred and deferred —as some of the railway companies had done, and with "contingent rights," as in the case of the Brighton Company—would simply make matters worse. The Board had considered the question; but they saw that it was so difficult and complicated that it would, as he had just said, merely have made matters worse. What they wanted was simplification; and nothing could be more to the point than what Mr. Soden had just said. They wanted unification; it was not a question about fighting for a shilling, or "the tip of a pheasant's tail." If the price of gas was likely to go up above 2s. 6d., then under the proposed scheme of commutation the "B" stockholders would lose; if it was likely to remain below 2s. 6d., they would gain. What were the probabilities of this question? The price had not been above 2s. 6d. for ten years; and yet they had gone through the most difficult time which he had experienced in his half century of gas affairs. They had pulled through this, although they had dipped largely into the reserve fund. But if they had raised the price, they would have increased instead of reduced the reserve fund. As they had got over all this difficulty, and had not exceeded 2s. 6d.—the price being now 2s. 3d.—the probability was that the price would continue below 2s. 6d. rather than above it. If so, the ground was completely knocked from under the feet of "B" shareholders like Mr. Harris. They were also saving in various ways, as he had already pointed out. Mr. Harris has asked a plain question—what they would do in the event of Parliament not allowing this appropriation of money, which absolutely belonged to the "A" shareholders. This question was put to Mr. Bush by a shareholder; and the Secretary stated that he had no authority from the Board as to the point. Thereupon the shareholder said: "What do you think will be done?" and Mr. Bush replied that he thought the loss would be divided. The Board thought so too—that the "A's" and "B's" would in that case have to give up something. He would not ask the "A's" to accept anything less than they were now receiving—15½ per cent. He felt that the question of appropriating the money was absolutely just, and that Parliament would see that it was. He was not aware that the "A" shareholders could not demand it now in cash. He thought there was very little doubt that this power would be given. If not, the effect would be that the "A" would get £298 2s., and the "B" must come down to £232 3s. 9d.; so that the "B" would give up 6s. 3d., and the "A" 18s. If (which they did not expect) Parliament said that the money could not be appropriated as was proposed, they could ask for the insertion of a clause in the Bill to the effect that any "A" or "B" holders who did not like the reduced terms could still retain their rights and privileges as "A's" and "B's." For every £1350 of "B" there must be £500 of "B." He had himself made this offer to Mr. Harris, and the other large shareholder—that he would stand out so that they might have their full rights and privileges as "B's," and in order to balance them; but this offer was refused. He appealed to every reasonable man whether this was not fair. If Parliament refused the Directors' proposal, they would take what Parliament would give them; and then they said that, if there were certain "A's" and "B's" who did not wish to commute, they could still retain their rights and privileges as they were. If this was not satisfactory, he did not know what would be.

The resolution was then put, and declared to be carried with three dissentients (Mr. Harris, Mr. Hobson, and one who would not give his name).

The CHAIRMAN: After this very long meeting, I think that that is a very satisfactory ending; and I thank you very heartily for your patience and consideration.

On the motion of Mr. HOBSON, a cordial vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN acknowledged the vote; and he afterwards warmly referred to the services of the staff, and proposed a vote of thanks to the officers and employees for their devotion to the Company's interests.

The resolution was carried unanimously.

The SECRETARY acknowledged the compliment, and expressed great regret that his friend and colleague the Chief Engineer was not present to respond for his department. Speaking on behalf of all his brother officers and himself, he expressed an earnest hope that Mr. Frank Livesey would soon be restored to health and be among them again.

The proceedings then terminated.

BRENTFORD GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. HOWARD C. WARD presiding.

The SECRETARY (Mr. W. Croxford) read the notice calling the meeting; and the report and accounts, which were summarized in last week's issue, were then taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said the latter did not compare very favourably—indeed, they compared very unfavourably—with those that were produced this time last year, because then they had a surplus of £9240 after paying the dividend, while to pay the full statutory dividend now, they would have a deficit on the half-year's working of £5528. Explaining how this arose, he said, in the first place, the shareholders must remember that, when they had the surplus of £9240 in December, 1894, it was the duty of the Directors to reduce the price of gas; it was not only their duty, but it was their pleasure to do so. The reduction of 2d. amounted for the half year to about £5300. In addition to this, there was an increase of £2550 on wear and tear account. What they did not expect, and what they greatly regretted, was the loss on residuals, as compared with the December half of 1894 (although a greater quantity was sold), of no less than £5581. On the other hand, there was a saving of wages, owing to the inclined retorts, of £2780, although there was a slightly increased quantity of coal carbonized, which was a very satisfactory result. Then there was a considerable increase in the meter and stove rents. Altogether this would give them a very funny result; and yet it would show how very nearly they calculated their position for the half year ending December last. If they took the expenditure side of the revenue account, the increase, as compared with the second half of 1894, was £6184; the loss on the gas-rental was £525; and the loss on residuals was £5581. The extra amount required for the statutory dividend, which was now ½ per cent. more than was paid in 1894, would be £3587. This made a total of something like £15,800. The surplus at December, 1894, was £9240, which would leave a deficit, taking the dividend at 12 and 9 per cent., instead of 12½ and 9½ per cent., of £5162 in the half year. Then there was an increase in the meter and stove rents of £1020, and a small profit on interest received and paid (£89)—together £1109; and making the deficit to pay 12 and 9 per cent. dividend £4053, and to pay 12½ and 9½ per cent., £5528. It would be observed that this £5528 exactly tallied with the loss on the residuals, over which they had no control whatever, and which they certainly did not expect. It was a loss that had been felt by every gas company—anyway by all the Metropolitan Gas Companies, and some more than themselves, in the half year. But it was very curious that, calculating as they did for a reduction in the price of gas and an increase in the dividend, the difference in the residuals in the half year should represent the deficit in the amount they required to pay the shareholders the full dividend, with a small surplus. At the last half-yearly meeting, a reserve fund was established; and what the Directors intended doing was to keep the dividend as near as possible to 12 per cent., and to put the extra money which they might earn, and to which the proprietors were entitled, to the credit of the reserve fund. The result was that, after paying a 12 and 9 per cent. dividend, they would carry forward undivided profits amounting to £33,200, which was about sufficient to pay a similar dividend next half year. There was one charge which he had not said anything about, but to which he ought to refer. It was a very serious charge, and one which, he was not quite sure, with very great deference to the Local Authorities, they should press the Company with as they did. It would be seen that the increase in the rates and taxes during the half year, by reason of the quinquennial assessment, had been about £1600, which was a good deal of money in a half year for a Company like theirs. The Directors regretted this very much; and they thought it excessive. They also thought that, when it came to the question of appealing from these assessments, it became a very serious matter; and they had to consider whether the remedy was not a very costly one. He knew it was; and the Directors believed they were taking the wiser course in not making an appeal against the assessments—hoping, at any rate, they would not grow any larger. To use a homely phrase, "the remedy was really worse than the disease." The Directors regretted this increase, because it must have the effect of deferring the time when the price of gas could be reduced, which was an injury both to the consumer and the shareholder. Proceeding to give a few interesting details, the Chairman said that the coal carbonized during the half year was 66,000 tons, as against 63,000 tons in the corresponding period of 1894, which was an increase of about 4·6 per cent. The increase in the total rental was also about 4½ per cent., which, seeing that the charge was 2d. per 1000 cubic feet less, was very satisfactory. The residual products had produced £22,413, as against £27,900; being a decrease of about £5500. The return for the products in the past half year was 6s. 9d. per ton, as against

8s. 10d. in the latter half of 1894, which was 2s. 1d. per ton less. He hoped they had now turned the corner, and that they would soon have a return to good trade and a better price for the bye-products. There were gentlemen present who knew something about this matter; and they were of opinion that these products would "look up" a little in the early future. Another interesting matter was the new source of business they possessed—that was, the automatic meter system. They had already 4044 of these meters fixed and in use; and so much were they appreciated, that they were fixing them at the rate of 60 or 70 per week. Speaking generally, he was well satisfied with the results of the half year, excepting the disappointing item of products. With regard to the works, they were in first-rate order. As to the inclined retorts, they had, by their use, saved in wages something like £2780. The amount of coal carbonized in these retorts in the half year was equal to 65 per cent. of the whole quantity used. There was a certain amount carbonized in the inclined retorts in 1894; but by reason of the increased quantity that had been carbonized in 1895, they had made the saving he had mentioned in wages alone. It might be interesting also to know that this reduction in wages represented about 1s. per ton of coal carbonized. The number of men employed in the retort-houses at Brentford on Jan. 31 was 44, as against 102 on Feb. 1 last year, which spoke a good deal for these retorts. The inclined-retort houses, both at Southall and Brentford, were completed during the half year; and they had another inclined-retort house to build at Southall. Consequently, during the present half year, they expected to have a still larger percentage of the coal carbonized by this system. In conclusion, the Chairman expressed regret that they had lost a valued Government official in the person of Sir Henry Calcraft, who, he said, was a most pleasant man for everybody to work with, and one who would not be very readily replaced.

Mr. J. Orwell Phillips seconded the motion.

Mr. W. Hughes called attention to a note in the accounts that the Company had purchased 390 butts of ammoniacal liquor during the half year; and he asked the Chairman to explain why it had been bought.

The Chairman replied that a small neighbouring Gas Company—the Uxbridge—could not deal very well with their liquor; and so they took it from them. He did not know that they were perfectly justified in doing this; but they purchased it to help them. It did not follow because the products were lower in value, they were not profitable.

Mr. Hughes said he did not see an insurance fund mentioned in the accounts; but The Gaslight and Coke Company had one.

Colonel W. T. Makins, the Governor of The Gaslight and Coke Company, said the insurance fund of the Company was against unavoidable accident, so that it should not trench upon the funds of the year. He had heard with great pleasure the speech of the Chairman. It summed itself up in two points. First, they had lost about £5000 by the lower price of the residuals. In this they suffered in common with everybody else who carried on a like business. Then they had lost £5000, in round figures, by the reduction in price. That was the wholesome and proper action of the sliding-scale; and it must not be looked upon as loss. The reduction was an incentive to their business; and it was carrying out the intention of Parliament in fixing the regulations of the sliding-scale. Still they had these two serious items of loss; but the £5000 reduction in price was compensated for by the increased dividend which they could pay under the sliding-scale. The other item to which he wished to refer—rates and taxes—was entirely beyond the Directors' control, in the same way as the price of residuals. As to the rates and taxes, many who took an interest in railway and gas and water undertakings in London had heard this "bitter cry" over and over again. But the fact was there was no more convenient milch cow for the local authorities for raising money to carry out their works than such companies. It was easy to assess a large company; but difficult to assess a small proprietor. It was not understood by the public, when they complained of the price of gas, that it was not in the power of the managers of gas companies to prevent these increases. The taxes in the case of The Gaslight and Coke Company represented 2½d. per 1000 cubic feet. They were put upon them by the Municipalities; and the consumers ought to consider the price of gas *minus* the taxes, because if they did not pay these rates in the price of gas, they would have to pay them in their local rates.

The Chairman: The rates are equivalent to 2½d. in the price of gas?

Colonel Makins: Yes; if the Company had no rates to pay, the price of gas would be 2½d. cheaper than it is.

The Chairman: May I ask if these rates are uniform throughout the Metropolis, or are you aware of any gas company who pay less than another?

Colonel Makins replied that there was a very glaring example. Complaint was constantly made of the differential price between the north and south of the river—between The Gaslight and Coke Company and the South Metropolitan Company. As regarded 2d. of the differential price, 1d. was accounted for, or nearly 1d., by the meter-rents which had been abolished north and not south of the Thames; and another 1d. arose from the extra amount of rates paid by the northern as against the southern Company. In the case of the northern Company, they amounted to 2½d. on the price of the gas; and in that of the southern Company, to 1½d. When comparison was made, these things ought to be taken into consideration. It was not easy to imbue the public mind with questions involving matters of this kind; and therefore it was incumbent upon those who occupied a position of responsibility to make it as clear as possible how the money went—that it was not extravagance in the cost of making the gas, but that it was the increment of extra rates and taxes and other things which made up the price. He was very glad indeed to hear what the Chairman had had to say on this point. It seemed to him that against these disabilities the Brentford Company had two very good features—one was the increase in the business; the other, the increase in their credit. He thought they shared this in common with other gas companies; but whether it was the appreciation of gold, or whether it was really the want of good, safe securities, there was no doubt that gas properties were in an excellent position in market value. He did not think any property had advanced so greatly in popular esteem. If they persisted, both north and south of the Thames, in sitting on their cash-boxes, keeping down the expenditure, and giving every facility to the public, then they would be able in the future, as in the past, to present the features of success and profits which excited the envy of other people.

The Chairman remarked that he did not wish to find fault with the South Metropolitan Company for being rated at the equivalent of 1½d. per 1000 cubic feet of gas. [Colonel Makins: We congratulate them.] However, there was the difference.

The motion was unanimously carried.

Dividends at the rates of 5 per cent. per annum on the preference stock, of 12 per cent. on the consolidated stock, and of 9 per cent. on the new stock were then declared.

Resolutions were also passed re-electing the retiring Directors (Mr. B. T. Makins and Sir R. H. Wyatt) and the Auditors (Mr. J. W. Field and Mr. Monier F. Monier-Williams); the remuneration of the latter being increased to £75 each per annum.

A vote of thanks to the Chairman and Directors concluded the proceedings.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Report and Accounts.

The accounts which will be presented, with the Directors' report, at the half-yearly general meeting of the above-named Company on the 9th prox., show a surplus income for the six months ending Dec. 31, 1895, of £5369 beyond the amount necessary to pay the usual dividend. Though there was a serious falling off in the receipts for coke and sulphate of ammonia, the revenue from the sale of gas shows a satisfactory increase of £5950, and from the sale of tar of £614, as compared with the corresponding period of 1894. The Directors recommend the payment of the maximum dividend on the various stocks and shares, which will amount to £38,263; carrying forward the sum of £7760. As mentioned in a paragraph which appears elsewhere, they have felt justified, having regard to the present satisfactory position of the Company, and to the fact that the reserve fund is full, in announcing a reduction of 2d. per 1000 cubic feet in the price of gas to all classes of the Company's customers; bringing down the charges, as from Lady-day, to 2s., 1s. 10d., and 1s. 8d. per 1000 cubic feet, according to consumption. The accounts show that, in the six months covered by the report, a sum of £4850 was spent for capital purposes; raising the total expenditure to £736,869, and leaving a balance of £59,501. The sale of gas produced £106,338; stove and meter rental, £5386; and the sale of residuals, £33,632—the total receipts being £147,422. The expenditure in connection with the manufacture of gas came to £80,983; with its distribution, £9840; management cost, £4191; and the total expenses were £104,656—leaving a balance of £42,766. The works, under the supervision of Mr. Fletcher W. Stevenson, M.Inst.C.E., carbonized 82,669 tons of coal and 19,672 tons of cannel in the past six months; and the following estimated quantities of residuals were produced: Coke and breeze, 61,504 tons; tar, 6492 tons; ammoniacal liquor, 3,229,000 gallons.

NEWCASTLE AND GATESHEAD GAS COMPANY.

Annual Report.

The Directors of the Newcastle and Gateshead Gas Company, reporting upon the results of the working during 1895, state that the revenue amounted to £238,797, and the expenditure to £170,779; leaving a balance of £68,018 as the profit for the year. Adding to this the undivided profits from the previous year—£9173—makes £77,191, which sum it is proposed to appropriate as follows: Interest on debenture stock, loans, and prepaid stock, £6237; intermediate dividend of £4 17s. 6d. per cent. paid in August on £615,000 stock, £28,982; second half-year's dividend of £4 17s. 6d. per cent. on £617,946 stock, £29,120; and reserve fund, £5000—leaving £7852 to be carried forward. There was an increase in the receipts as compared with 1894 of £17,232, and an increase in the expenditure of £13,070. Owing to the growing demand for gas, further extensions are being made at Redheugh, which, it is expected, will be available for use before next winter. During the year 13 miles of pipes have been laid in extensions and renewals, 1579 new branches have been laid, and 2096 old branches renewed; 1217 meters have been repaired, tested, and re-fixed; 166 ordinary street-lamps have been erected, and 11 specially large lamps fitted up for private consumers; and there is an increase of 87 cooking-stoves fixed, making the total number on hire 2070. The Directors also mention that a Bill has been introduced into Parliament for the creation of new capital and for acquiring land at St. Anthony's, Newcastle, on which to erect additional works. After the ordinary meeting of the shareholders an extraordinary meeting is to be held to consider the Bill, and to pass a resolution thereon.

Cagliari Gas and Water Company, Limited.—The receipts on revenue account of this Company during the past year, as shown by the report to be presented to the proprietors to-day, amounted to £25,381; and the expenditure, to £11,982—leaving, after the usual deduction for the sinking fund and a further £1000 to the reserve fund, a net revenue of £13,399. The amount available for division, including the balance brought from the previous year, is £17,936, out of which an interim dividend at the rate of 6 per cent. per annum was paid for the six months ending June 30, 1895, amounting to £4500. The Directors recommend a dividend at the rate of 8 per cent. per annum for the half year ending Dec. 31, amounting to £6000; making a dividend for the year of 7 per cent. They also recommend that a bonus of 5s. per share be paid. This will amount to £1875, and leave to be carried forward a balance of £5561. The water receipts for the year show a slight increase over those of the previous year. The gas receipts rose by £847; while the expenditure was only £37 more than that of the preceding year. The gas unaccounted for averaged 4½ per cent. of the make over the entire twelve months, compared with 5 per cent. in the previous year.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Half-Yearly Report and Accounts.

The Directors of the above-named Company have issued the report and accounts for the half year ending Dec. 31 last, in view of the general meeting next Friday. In the former, it is stated that the price of gas was reduced by 1d. to 2s. 7d. per 1000 cubic feet from Midsummer last, which diminished the Company's revenue, and benefited consumers, by about £1600 in the second half of the year. There was an increase of 4·53 per cent. in the quantity of gas sold as compared with the corresponding half year, due to some extent to the demand for gas by the working classes. There were 686 small houses fitted up and supplied with gas; bringing up the total on Dec. 31 last to 3146, supplied by means of automatic or coin meters. Coal had cost less in the half year; but, on the other hand, the price of coke, as was expected with cheap coal as a competitor, fell considerably from the high figure of 1894. As to sulphate of ammonia, the price is lower than has ever been known. It is pointed out that the great drop in the price of this article is due to various causes—the agricultural depression, the low price of nitrate of soda, and the persistent holding of large stocks by some makers against a falling market. This has undoubtedly not only further depressed the market, but effectually "nips in the bud" any tendency to recovery. Hope is expressed that these stocks will soon be disposed of, when further depression from this cause will cease, and the way be open for a chance of improvement. The net result of these various influences on the Company's business is that the amount of profit is nearly sufficient to pay the same dividend as before. The price charged for gas—viz., 2s. 7d. per 1000 cubic feet—entitles the proprietors to a dividend at the rate of 5⅜ (£5 7s. 6d.) per cent. The Directors on a former occasion advised that fractions of one-eighth per cent. should not be divided, but added to the reserve fund; and to this the shareholders assented. They now recommend that dividends be paid at the following rates per annum: 5 per cent. on the preference stock, and 5¼ per cent. on the ordinary stock, less income-tax; the odd ⅛ per cent., amounting to £334 7s. 6d., to be carried to the reserve fund. The deficiency will be taken from the undivided balance; and there will then remain £3580 to carry forward, in addition to a reserve fund, including the £334 7s. 6d., of £40,521.

The accounts accompanying the report show that a sum of £12,733 was expended for capital purposes in the second half of the year. The larger portion of this (£7982) was for buildings and plant connected with manufacture; and of the rest, £2904 was for meters, and £1187 for stoves. The total capital expenditure up to the end of the year was £646,132; leaving a balance of £16,261 unspent of the £662,393 raised. The total gas-rental in the half year amounted to £58,182; the rental of meters (13,003 ordinary and 3146 automatic), to £1090, and of stoves (3709 ordinary and 2901 automatic), to £607; residuals produced £17,263; and the total receipts were £77,171. The expenditure on the manufacture of gas came to £48,213, of which £30,859 was for coal; on its distribution, to £5810; management cost £2877; and the total expenses were £61,606—leaving £15,565 to go to the profit and loss account. The amount available for division is £19,458. The works, under the supervision of Mr. Charles Gandon, M.Inst.C.E., produced in the past half year 495,349,000 cubic feet of gas, of which 448,402,000 cubic feet were accounted for. There were 47,055 tons of coal, 714 tons of cannel, and 36,865 gallons of carburine employed in the manufacture of gas; the estimated production of residuals being: Coke, 573,237 cwt.; breeze, 3656 yards; tar, 477,797 gallons; ammoniacal liquor, 8846 butts. There were 340 tons of sulphate of ammonia made; making, with the 40 tons in store, 380 tons, of which 305 tons were sold.

BROMLEY GAS CONSUMERS' COMPANY.

The Half-Yearly Report and Accounts.

In the report to be presented at the half-yearly general meeting of this Company on the 27th inst., the Directors state that notwithstanding the prevalence of mild bright weather in the second half of last year, as compared with the corresponding period of 1894, the make of gas shows an increase of 1,700,000 cubic feet, or 1·7 per cent. In the six months ending at Midsummer, the production was exceptionally large, owing to the frost of the preceding winter; and gratification is expressed that the quantity of gas made in the subsequent similar period nearly approached it. Against this, however, has to be set the greatly decreased prices obtained for residuals. Nevertheless, the profit and loss account shows a balance of £6062; and the Directors recommend the usual dividends, at the rates of 11½ and 8½ per cent. per annum upon the 10 and 7 per cent. shares. This will absorb £5723, and leave £339 to be carried forward. With regard to the works, which are under the supervision of Mr. W. Woodward, the oil-gas plant is now completed, and is giving excellent results; as is also the hydraulic stoking machinery. The works are stated to be in excellent condition, and equal to meeting the requirements of a considerably extended business. There were 10,503 tons of coal and 29 tons of cannel carbonized in the six months under notice; and 101,539,000 cubic feet of gas were made, of which 95,661,500 cubic feet were sold and 1,878,000 cubic feet used on the works. The quantities of residuals produced were as follows: Coke, 10,533 chaldrons; breeze, 1341 chaldrons; tar, 105,387 gallons; and ammoniacal liquor producing 62 tons of sulphate.

Damage to a Railway by the Bursting of a Water-Main.—A rather alarming accident occurred on Monday last week about three miles from Lichfield, on a branch of the London and North-Western Railway. The main of the South Staffordshire Water Company from Lichfield to Wednesbury, which runs alongside the line, burst at the place named; and a large volume of water escaped, causing considerable damage to the permanent way, and stopping traffic for a time. Mr. H. Ashton Hill, the Chief Engineer of the Water Company, with the railway officials, supervised the repair of the damaged main and line, which was completed on Tuesday.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The profits of the Airedale Gas Company for the half year ended Dec. 31 am ount to £1077, which, added to £803 from the June half year, makes a total of £1881. The Directors propose the payment of a dividend at the rate of 5 per cent.

The report to be presented at the half-yearly general meeting of the Bristol Gas Company next Friday is short, but it is satisfactory. The balance available for division is £40,846; and a dividend at the rate of 5 per cent. per annum on the nominal capital will be recommended. After paying this and the interest, and placing £5000 to the reserve, there will be £17,509 to carry forward. The accounts accompanying the report show that a sum of £4590 was spent for capital purposes (mainly on new buildings, mains, plant, &c.) in the half year ending Dec. 31 last. The receipts in that period amounted to £123,371; the expenditure, to £95,005—leaving a balance of £28,366, as compared with £33,832 in the corresponding half of 1894. There were 78,960 tons of coal and 7761 tons of cannel carbonized; and the following estimated quantities of residuals were produced: Ordinary coke, 49,781 tons; cannel coke, 3464 tons; breeze, 7027 tons; tar, 980,154 gallons; and ammoniacal liquor, 1,862,214 gallons.

The working of the Bromsgrove Gas Company during the past year shows a favourable result. There is an available balance of £1452, out of which a dividend of 6 per cent. is to be paid on the ordinary, and 7-10ths of 6 per cent. on the "B" shares of the Company. A sum of £250 is also to be placed to the reserve fund. At the meeting of the shareholders yesterday week, Mr. T. Green (who presided in the absence of the Chairman, Mr. W. Jefferies) congratulated them on the amount of the balance, and the increase in the dividend, which had been obtained in the face of a mild winter, and a reduction in the price for part of the year.

The ordinary general meeting of the Chester United Gas Company was held on the 6th inst.—Mr. J. Gamon in the chair. The Directors presented to the shareholders a good record of work in the past half year. There was a steady increase in the use of cooking and heating apparatus, and consequently a greater demand for gas; incandescent burners and automatic prepayment meters are in demand; the works and plant (under Mr. R. Hunter's able management) are in a thoroughly efficient condition; and the quality of the gas has been kept 2 candles above the standard. The accounts accompanying the Directors' report showed an increase in the rental from gas of more than £600; but the return from residuals was diminished, owing mainly to the low price of sulphate of ammonia. The balance to the credit of the profit and loss account stood at £3937; and the Directors recommended the declaration of full statutory dividends. After paying these, there would remain a balance of £575 to be carried forward. The Chairman, in moving the adoption of the report, congratulated the Company upon what had been a successful year, despite the exceptionally severe winter and dark days. The increase of gas in the early months of the year was quite beyond all precedent. The amount returned to the consumers in discounts was no less than £1382, which, he thought, was a very handsome bonus. The incandescent gas-light was a new and excellent feature; and the Directors had thought it proper to do everything that was necessary in introducing it to their customers, although it effected a saving in the consumption of gas, and was not so profitable to the Company. The additional consumers in 1893 numbered 68; in 1894, 43; and in 1895, 100—showing that gas was growing in favour rather than otherwise. The demand for slot meters was increasing very fast—indeed, they were receiving more orders than they could fulfil. Altogether, he thought, they would find the working man would be a great supporter of the prepayment meter, which provided him with great conveniences for cooking, as well as the safest and best light that could possibly be used in a cottage. Sir T. G. Frost seconded the motion; and it was carried. The dividends recommended were then declared. A vote of thanks having been accorded to the Chairman, Directors, and officers of the Company, the Chairman remarked that he had no hesitation in saying that the manufacture of gas conducted by Mr. Hunter was most excellent. The results were good in every way; and he honestly believed the article that was delivered to the consumers was as good as it possibly could be made by the present appliances. The Secretary (Mr. J. Pye) was a zealous and long-tried officer; and he was ably seconded by his staff.

The revenue account of the Eastbourne Gas Company shows a profit for the past half year of £6019, which, added to £10,353 (the balance brought forward after payment of the dividend in August last), and the sum of £141 received for interest, will give a total sum of £16,513 available for dividend. The Directors recommend that dividends for the half year be declared at the rate of 14 per cent. per annum on the £20,000 original capital, and also on £12,490 (the amount raised on "C" shares), and at the rate of 11 per cent. on the £65,000 paid-up capital raised on "B" shares, which will absorb £5849, and leave £10,664 to be carried forward.

The profit earned by the Elland-cum-Greetland Gas Company in the past year, with the balance brought forward, was £4846. An interim dividend at the rate of 12s. per share was paid for the six months ending in June; absorbing, with the prescribed dividends on the preference shares and interest on the loan capital for the year, £2482, and leaving a balance of £2364 available for division at the general meeting next Friday. The Directors recommend a further payment of 12s. per share; making a dividend at the rate of 12 per cent. per annum. The quantity of gas sold for ordinary private lighting was 75,833,200 cubic feet; for public lighting, 4,433,100 cubic feet; and by prepayment meters, 1,168,100 cubic feet. This brought in a net sum of £10,611. Residuals produced £2945; and the total receipts amounted to £13,869. The expenditure was £9452; leaving £4417 to go to the profit and loss account. The works (under the management of Mr. R. Porter) carbonized 8504 tons of coal; and of the residuals produced the following quantities were sold: Coke, 3504 tons; tar, 562 tons; and ammoniacal liquor, 950½ tons.

The half-yearly report of the Mirfield Gas Company shows that the profit amounts to £2622, which allows of the payment of a dividend of 10 per cent. on the old shares, and 7 per cent. on the new shares. This will absorb £2325.

The half-yearly general meeting of the Newport (Mon.) Gas Company was held on Monday last week—Mr. E. J. Phillips, J.P., in the chair. In moving the adoption of the Directors' report, with the accounts for the half year ending Dec. 31 last, he stated that the position of the Company was very satisfactory. The revenue was £20,523; and the expenditure, £15,357—leaving a balance of £5165, which would be sufficient to pay the dividends and leave a small balance. They had made 4 million feet more gas than in the corresponding period of the previous year; and the illuminating power had been maintained up to 17 candles, which was considerably higher than the Act of Parliament required. He was glad to say that the penny-in-the-slot system was being largely adopted. They had 382 of these meters in use; and the demand for them was increasing. There was also an augmentation in the number of gas-stoves for cooking and heating purposes; and 166 new services were supplied. There had been one drawback—viz., the discontinuance by the Corporation of gas in a portion of the town, in favour of electric lighting. However, the gross payment the Company received for the 50 displaced gas-lamps was £359 14s, while the 40 substituted arc lamps would cost £25 apiece. Therefore the cost to the ratepayers for the electric installation for that portion of the town would be £1000 instead of £359 a year. There were three large ratepayers in the town for which he (the Chairman) could speak—viz., the Great Western Railway Company, the Alexandra Docks Company, and the Gas Company. They derived no benefit whatever from the change in the lighting; and therefore they had a fair complaint to make in the expenditure by the Corporation of £35,000 for the electric light. He calculated that the cost of sinking fund, establishment charges, material, &c., would entail an expenditure of £3800 a year on the ratepayers of the borough; and, as ratepayers, they had a right to complain, even if they had not that right as shareholders of the Gas Company. Dr. Brewer seconded the motion; and it was carried unanimously. Dividends at the rates of 5, 3¾, 3½, and 2½ per cent. for the half year on the various stocks were then declared. A vote of thanks having been accorded to the Directors and officials, the Chairman, in reply, paid the latter and the staff generally a high compliment for their energetic and faithful services. The Secretary (Mr. E. F. Marfleet) and the Engineer and Manager (Mr. T. Canning, J.P., Assoc.M.Inst.C.E.) briefly acknowledged the compliment.

The half-yearly meeting of the Preston Gas Company was held yesterday week. The statement of accounts for the year ended Dec. 31 showed a balance of profit amounting to £27,980; and after deducting interest on loans and the dividend paid in August last, a balance of £13,958 remained for the half-year's dividend. A dividend for the last half year of 9¼ per cent. on stock "A" and 3½ per cent. on stock "B" was declared. At an extraordinary meeting held afterwards, a resolution was passed authorizing the Directors to issue as may be required £30,000 of preference stock, and to borrow on mortgage £7500.

The revenue of the Walker and Wallsend Gas Company in 1895 amounted to £16,992; and the expenditure, to £10,828—leaving £6164 as the profit. With the undivided profits of £3398 brought forward, this gives a sum of £9562 to be dealt with. It is proposed to devote £6165 to the following purposes: Interest, £719; depreciation fund, £500; intermediate dividend of £4 2s. 6d. per cent., £1762; second half-year's dividend at the same rate, £1762; and arrears of dividend, £1321. The Directors, in their report, remark that there was an increase of £1589 in the receipts as compared with 1894, and an increase of £953 in the expenditure. There has been a considerable improvement during the year in the consumption of gas; and the receipts from coke and tar have increased, while those realized for sulphate of ammonia have decreased. In the course of the year, additional mains have been laid; and several automatic prepayment meters adopted. Concerning the works, new annular, in place of pipe, condensers have been erected, and a new tar and liquor tank provided at the Walker works; while a duplicate boiler has been fixed at the Willington Quay works. The report also states that the Newcastle and Gateshead Gas Company are seeking powers to erect new gas-works, part of which will be within the authorized limits of this Company; and the Board are taking steps to guard their interests. The Directors lament the death of their colleagues, Mr. Charles Mitchell, late Vice-Chairman, and Mr. W. Kilvington; and they state that they have appointed Mr. C. W. Mitchell and Mr. J. Wigham Richardson to fill the vacancies. The Directors recommend that a reduction be made in the charge for gas, commencing from the 1st ult., as follows: That the maximum price be reduced from 2s. 10d. to 2s. 6d. per 1000 cubic feet, and that a reduction of 2d. be made to large consumers, according to the existing scale, less the usual discounts.

The revenue account of the Westhoughton Gas Company shows a balance of profit on the past half-year's trading of £704, which is reduced by payment of loan interest to £621, out of which a dividend at the rate of 5 per cent. per annum is recommended.

Water Companies.

The half-yearly meeting of the Colne Valley Water Company was held last Tuesday, at the Charing Cross Hotel. In moving the adoption of the report and accounts (which were noticed last week, p. 305), the Chairman (Mr. J. R. Hollond) said the total amount of the water-rates and meter-rents for the half year was £8114, as against £7517 in the corresponding period of 1894; being an advance of £597. The increase in the first half of 1895 compared with the same period of 1894 was £679; so that they had a total increase in the year of £1276. The number of new supplies in the six months under notice was 211, representing a revenue of £457 per annum; and in the first half of the year, it was 128, representing £289. The total for the whole year was therefore 339 new supplies; giving an additional revenue of £746 a year. The average of the new supplies for some years past had been 256; so that the year lately closed had been above the average. On the expenditure side, they had been forced to incur a great outlay owing to the severe frost which occurred in the spring of 1895, and to the drought that followed. They considered these two elements increased their expenditure by about £900. There had also been a heavier amount to pay for rates and taxes—about £150 more than in 1894. The quantity of water pumped was 216 million gallons; making a total for the year of 441 millions. In 1892, they pumped 319 million gallons; in 1893, 362 millions; and in 1894, 356 millions. Regarding the works, contracts had been entered into for the construction of a new beam engine, and for an additional softening reservoir; and considerable progress had been made with the latter. Contracts for a new engine-house, &c., would be considered shortly. Part of the money required for the additional works would have to be raised next month by the issue of new shares by tender. The motion was seconded by Mr. C. E. Keyser. A number of questions were asked; and one shareholder suggested the advisability of the Company having an auxiliary supply to fall back upon. Replying to the inquiries, the Chairman stated that the shares to be issued would be entitled to a maximum dividend of 10 per cent. As to the supply of water, they had a large yield from the new well at Bushey; and they had 2½ days' supply stored in their reservoir. The fact that they passed through the severe frost and drought all right was satisfactory evidence of the efficiency of their supply. The amount of the new contract for the beam engine was £9500; and it would be of 200-horse power. The motion was adopted; and a dividend at the rate of 4 per cent. per annum was then declared. The retiring Directors and Auditor were re-elected; and votes of thanks were passed to the Chairman and Directors and staff.

The Cleveland Water Company are able to report a fair increase in business during the past half year. The disposable balance is £3183, as against £2797 at Dec. 31, 1894. A dividend at the rate of 7½ per cent. per annum is to be paid on the original and "A" shares, and 5½ per cent. on the "B" shares.

The East Worcestershire Water Company report that they have connected 133 additional services to their system during the past half year; making the total 3903, exclusive of Droitwich and Rednal. The water pumped averaged 503,181 gallons daily. Considerable waste has been detected in the district; and in order to abate this, the Directors decided that, from Oct. 1 last, no charge should be made for renewing washers on domestic supply taps. There has been a fair increase in the water-rents; and the net profit is £1075, which it is proposed to carry forward.

The profit of the South Hants Water Company for the year ending Dec. 31 is £5158, out of which the Directors recommend the payment of a dividend at the rate of 8 per cent., free of income-tax, for the past six months on the ordinary, and 5⅝ per cent. on the new shares, which (with the interim dividend of 5 per cent. and 3½ per cent. per annum respectively) will absorb £4431; leaving £727 to be carried forward. Some 615 additional houses have been added to the rent-roll during the past year, giving an estimated increased annual rental of £873. The net increase in the year's rental is £1291, as compared with £607 in 1894. The new reservoir at Bitterne, and also the two settling reservoirs at Michelmersh, are practically completed, and will be available early in the spring. Mains are now being laid to supply Lyndhurst. Regarding the exceptional frost of last year, it is stated that the whole of the cost of damage, amounting to about £875, had been paid out of the revenue of the year.

Presiding at the annual meeting of the Weardale and Shildon Water Company, on Monday last week, the Chairman (Sir David Dale) gave the shareholders a large amount of statistical information concerning their affairs. In the first place, he stated that the number of £25 shares allotted was 22,000; giving a share capital paid up of £550,000. The premiums received in shares up to Dec. 31 last amounted to £2667. The number of shareholders on the register was 1149. The amount of mortgages on Dec. 31 was £65,120, receiving interest at the rate of from 3 to 3½ per cent. Since then the interest on £29,250 had been reduced from 3½ to 3 per cent.; and £1500 had been lent to the Company at 2⅞ per cent. The additions to capital account during the year totalled to £2004. The gross receipts were £36,863, as against £37,061 for the previous year. There had been a decrease of £504 in the manufacturing supply; but, on the other hand, there was an increase of £355 in the receipts from domestic supply. In 1894, there was a special supply afforded to the Consett Iron Company in consequence of the supply of the Consett Water Company not being equal to the full needs of the former. This had not been necessary in 1895; and consequently they had suffered in revenue. The decrease on the total receipts being £198, and the increase in expenditure £536, they had a total disadvantage compared with 1894 of £734. The number of houses into which their water was laid at Dec. 31 last was 31,430, of which 400 were added during the year. The length of the mains and service-pipes was as nearly as possible 260 miles, of which 10¼ miles were laid during 1895. The accounts did not admit of the Directors prudently recommending a larger dividend than for the two previous years—viz., 4¾ per cent. They began in 1880 with 3¼ per cent.; in 1881 it was 3 per cent.; 1882, 3 per cent.; 1883-7, 3⅝ per cent.; 1888, 3¾ per cent.; 1889, 4 per cent.; 1890, 4¼ per cent.; 1891-2, 4½ per cent.; and 1893-5, 4¾ per cent. The report and the dividend recommended were adopted.

The Directors of the Woking Water and Gas Company, in their report to be submitted at the ordinary general meeting on the 25th inst., state that the total expenditure on capital account up to Dec. 31 last was £81,563. The revenue for the year 1895 was £6194; the expenses on revenue account being £2493. The sum of £220 has been written off profit and loss, on account of the extraordinary expenditure (£330) incurred through the frost in the early part of the year, leaving £110 still to be written off. The balance carried to the profit and loss account is £3700. The amount available for division is £1576, out of which the Directors recommend the payment of a dividend at the rate of 4 per cent. per annum for the past six months, free of income-tax. This will absorb £1494, and leave £82 to be carried forward. The Engineers (Messrs. J. Quick and Son) report that the Company's works are all in good order, and that the wells are yielding an ample supply of water.

The Explosion at the Hyde Gas-Works.—The old lady who was injured on the occasion of the explosion at the Hyde Gas-Works on the 27th ult. (see *ante*, p. 237) has since died from the effects; and an inquest has been opened, and adjourned till next Thursday. It is believed that no blame can be attached to anyone; but the cause of the accident is to be thoroughly investigated—possibly by a Board of Trade Inspector.

CHESTERFIELD GAS AND WATER WORKS ARBITRATION.

Surveyors' Institution, Westminster—Friday, Feb. 7.

(*Before Sir* GEORGE B. BRUCE, *Umpire.*)

The proceedings in the arbitration between the Chesterfield Water and Gas Company and the Chesterfield Gas and Water Board, to determine the amount to be paid for the Company's undertaking, were continued to-day. Sir FREDERICK BRAMWELL, F.R.S., representing the Company, and Mr. CORBET WOODALL, M.Inst.C.E., the Board, sat with the Umpire as Referees.

Mr. C. A. CRIPPS, Q.C., M.P., Mr. R. M. BRAY, and Mr. A. J. RAM appeared on behalf of the Chesterfield Water and Gas Company; while Mr. R. D. M. LITTLER, C.B., Q.C., and Mr. J. D. FITZGERALD, Q.C., represented the Gas and Water Board.

Mr. *H. E. Jones*, in cross-examination, said there had been a certain amount of stagnation in the last few years in Chesterfield. Between 1884 and 1894, there was a decrease in the receipts for private lighting of some £40. The general volume of business had increased from £10,871 in 1884 to £12,416 in 1894; and he attributed the decrease in the net income to increased expenditure.

Mr. LITTLER: Would you regard it as an unfavourable circumstance in connection with a gas undertaking, if the increased receipts were almost entirely in connection with public lighting, and the local authority had an Electric Lighting Order?

Witness: I do not think I should be alarmed. If the whole increase practically was due to public lighting, and the local authority adopted the electric light, the increase would disappear. I cannot say how much of the increase is due to public lighting.

Mr. LITTLER said that the consumption of gas for private lighting was 47,407,000 cubic feet in 1880, and 42,779,000 cubic feet in 1894; and in no fewer than seven years out of the intervening time, it had fallen below 40 millions.

Continuing, witness stated that, if he found no greater difference between the years 1890 and 1894 than that between 40¼ million and 42¾ million cubic feet of gas, he should not say there had been any striking increase. He was informed, however, that there had been great stagnation in the population and trade. In 1880, the amount of gas used for public lighting was 3,300,000 cubic feet; in 1894, 10,467,000 cubic feet. The numbers of lamps in these years were 261 and 408 respectively. The private lighting should have increased in proportion; and it would, he believed, have done so, but for the adverse conditions of trade. Electric lighting was much dearer than incandescent gas lighting, except in the case of one sort of lamp. He did not know that the largest employers of labour in Chesterfield had had to give up gas because of its bad quality.

Mr. LITTLER: If the following is a proper and true description of the gas, would you say it was an excellent concern to buy: "The quality of the gas was so bad that the men were compelled to burn candles to enable them to work their machines, though the gas-burners were placed above the machines"? That is an extract from a letter from a large employer of Chesterfield.

Witness said he had known of complaints of that kind which were due to the gas burner or pipe.

Mr. LITTLER: Supposing it to be a normal state of things, would you recommend buying such a business on 33⅓ years' purchase?

Witness replied that the fact remained that there was a business, and that it was increasing. He could not understand why it was common talk that one had to light a candle to see if the gas were alight, because the Corporation had the gas tested. Assuming that, despite perpetual complaints and threats of legal proceedings, the Company never attempted to make the supply better, he should say it showed what benefit would accrue to the Corporation when they took the business over. The rate of purchase asked—28½ years—was the figure for a good concern. It was a consideration in fixing the price that the Company were charging their maximum price for gas, unless there was something which would aid in the future. It was true that, although the Company were charging the maximum rates, they were only paying a little over two-thirds of their maximum dividends; but they had to consider the large rates and taxes that the Company were paying, and which, if reduced, would greatly add to the dividend. It was common knowledge that gas companies generally did not pay in rates more than 2d. per 1000 feet manufactured; while the Chesterfield Company were paying over 7d. Speaking at short notice, witness could not mention a company of the size of that at Chesterfield which had not reduced their rates for gas since 1884, or one which, with a maximum charge of 4s. per 1000 cubic feet, had not reduced their maximum since 1884. Preston supplied 19-candle gas tested by means, he believed, of a special burner; and their rate was 3s. 7½d. per 1000 feet.

Mr. LITTLER pointed out that the official requirement in the case of that Company was 18 candles; and in the result, they gave gas of 19·15-candle power. Their rates were subject to discounts of 15 and 20 per cent., and were on the sliding-scale.

Witness said Preston had not been standing still for years, as Chesterfield had.

The UMPIRE: What is the statutory obligation at Chesterfield?

Mr. LITTLER: Fifteen-candle power.

The UMPIRE: What is the candle power actually?

Mr. CRIPPS replied that it was about 17.

Mr. LITTLER, reading from the Board of Trade returns, said it was given as 15·90.

Witness (continuing) said it was very unfortunate that the Company had existed from 1825 without having a reserve fund. This arose partly from the stagnation following the extensions made at the works. In a calculation as to the purchase of a concern of this kind, he should not consider the cost per ton of coal carbonized, because they must judge of its value by the obtainable dividends. If the Company, as regarded the gas-works, were to continue to exist, they would have to go to Parliament for power to raise more capital. Under the 1894 Bill, they sought to raise £90,000; and if that was required for water expenditure, there would be no margin for gas. The average capital per million feet of gas sold, over all England, would be about £600; in the case of the Chesterfield Company, it was over £1000. If witness were the owner of the business, he should at once reduce the gas-rate, and prosecute the rating appeal at Quarter Sessions. The Company produced about 9500 cubic feet of gas for every ton of coal. That was not low where no enricher was used, and when the quality of the coal was considered. Witness was not aware that the Company said in 1894 that they could not raise more capital. The last case he knew of mortgage bonds being converted into ordinary 10 per cent. capital, was that of the Eastbourne Company, who did it under witness's advice ten years ago. He knew that since 1880 the Chesterfield Company had not paid their maximum dividends, or dividends in arrear. They might be able to pay up these arrears in future, owing to the railway development of the town and the opening of new mines in the vicinity employing a great number of men. The consumption had been retarded by the absence of facilities. He could not say that the back dividends up to 1878 had been largely paid out of the sale of water in bulk. In his calculations, witness had aliowed 2d. in addition to the 1·8d. per 1000 cubic feet of gas figuring in the Company's account for maintenance, as the latter figure was very low; and he had set apart another 1d. per 1000 feet for an increase of wages and salaries, making the sum nearly 5d. This was a sufficient amount to allow for repairs; and he should not add anything for renewals, as there were such large surplus works. Chesterfield was badly off with regard to its residuals. Apart from the 10 per cent. for compulsory purchase, the sum witness suggested should be paid for the business was calculated on the assumption that it would produce, when re-invested, no more than 3½ per cent. Counsel then put to the witness a number of transactions, taken from the current number of the "JOURNAL OF GAS LIGHTING," in which shares in gas companies were recorded to have changed hands at prices which returned dividends of more than 4 per cent. Witness asserted that this might be done in the case of small blocks of shares; but if a large sum was to be invested, it could not be laid out to return such a percentage. Continuing, witness said he was not aware that the Company had any gas-stoves. The works were in good repair.

Mr. LITTLER: I put it to you that they are the most discreditable set of works in England?

Witness: The works are all right, though unfortunately there is not enough work to do.

In re-examination, witness said the new works were ready for use, though only the purifiers were actually employed. With a comparatively small additional expenditure, the output could be considerably extended. This expenditure would amount to some £7000, and would last till 1906. That was the secret of the whole matter. During the years of stagnation, the works had been a burden on the Company; but, owing to them, in 15 or 20 years' time, the Company would be in as good a position as any other. Witness would not say that the works had been badly managed. They could be made to produce the income allowed in the tables he had handed in, with fair management and with greater facilities. He did not think the electric light would interfere with the undertaking.

In reply to Mr. LITTLER, witness stated that all the improvements and facilities to make the interest on the capital up to the full were to be undertaken by the purchasers, who were to pay on the assumption that they would be successful, though they would have to run the risk of failure.

Mr. *E. M. Eaton*, Assoc.M.Inst.C.E., Chief Engineer to the Sheffield Water-Works, said he knew the water-works of the Chesterfield Company well. The whole undertaking was substantial, well made, and well maintained. His figures were practically the same as Mr. Hawksley's. Mr. Hawksley took the rainfall as at the height of the reservoir; but the district contained a good deal more ground, which was above the reservoir. The watershed in the higher parts rose to 1000 feet above sea-level. The rain-gauge was at the lower reservoir, which was 472 feet above sea-level. He thought the rainfall would be more than the 11 inches allowed; but he took the same figure as Mr. Hawksley, because it had never been accurately determined at the higher part. The pipes of the Company were, he believed, in good condition; and being in excess of the capacity necessary to distribute the water available, they could be used for any addition to the present supply.

In cross-examination, witness said there was not an ample supply of water for the whole population of Chesterfield. It would suffice only for 46,029 people at 18 gallons per head per day. When going to Parliament, the Company would naturally estimate the quantity necessary at 20 gallons per head per day.

Mr. LITTLER: You are to get rid of the whole undertaking; and we are to pay to the full, and take the entire risk?

Witness: Yes, because we are unwilling vendors. Continuing, witness said he valued the undertaking as nearly as he could at its value to the Company. The persons they were not able to supply only numbered about 1560. The Company, when promoting their Bill before Parliament, admitted they were twice without water last year. He himself could carry on the water business without raising further capital.

Mr. LITTLER: The Company came to Parliament on the ground that they could not?

Witness: They did.

And you came to support them?—As to their watersheds.

You also said that the time had now arrived when it was necessary to supplement the resources of the Company; and, further, that they could not supply more than 16 gallons per head per day?—I still adhere to that.

In further cross-examination, witness said he gave evidence on the Bill of 1894. The capacity of the existing reservoirs was not known then. Since that time it had been ascertained to be more than was thought in 1894. The rain-gauge at the Lower Linacre reservoir was in the worst possible position. In 1894, another was fixed; and by this time they had corrected the record of 26 years obtained from the old one. Pressed as to whether he thought the 19 or 20 months' record of the new gauge was sufficient to check the old one by, he said it was fairly applicable in order to deduce what the rainfall was. He was supported in this opinion by Professor Symons. The watershed referred to in the Bill of 1894 was adjacent to the one from which the Company now drew their supply. It was true that low-rented property produced

smaller water-rates, in proportion, than that which was more highly rented.

In re-examination, witness stated that the actual rainfall over the watershed of the Company was 11·6 inches. When he said that he himself could carry on the works without further capital, he meant that there was a large amount of waste going on. He thought that from 2 to 3 gallons per head per day could be saved and made available, which would enable the Company to go on for some time.

Mr. *Charles Hawksley*, recalled, said that, in the year 1865, the gas produced was only equivalent to 29 million cubic feet; but in 1869, it rose to 48 million cubic feet. The maximum make of gas was attained in 1877, when 56 million cubic feet were manufactured. Part of the property was freehold, and part leasehold. In 1874, new works were constructed, consisting of a purifying-house, meter-house, a gas-holder tank, retort-house, and coal-sheds. He advised the Company to erect these works, because the business was increasing so rapidly that it was necessary they should be prepared to meet the demands that seemed imminent. The Company did not foresee the great depression that followed. As a matter of fact, a slight increase year by year ensued until 1879. Then came a decrease till 1885, when the manufacture was 47 million cubic feet. In 1894, the figures were 56 million feet; and in 1895, 59 million feet. All these figures, he added, were calculated on the rate of manufacture at the end of each year. Actually, they would be rather less. Owing to the falling off in the consumption, only a portion of the new works had been used. The manufacturing power of the whole works was 350,000 cubic feet per day. If the increase in the consumption now in progress were to continue, it would be necessary to use the retort-house which hitherto had lain idle; and he thought this would be the case, owing to the building operations now proceeding, the railway facilities of the town, and the growth of trade. Gas was also likely to be used more largely for cooking and warming, and in consequence of the introduction of the prepayment meter. Witness produced some extremely voluminous tables, giving in great detail particulars as to his valuation of the gas portion of the undertaking. The adjusted profit for the year 1894, he placed at £5726. From this there had to be deducted £302, the interest on the proportion of the borrowed money attributable to the gas portion of the undertaking, which left £5424. This he multiplied by 28·57—the number of years' purchase—which gave £154,964. He then added £15,496, being 10 per cent. for compulsory sale, and £61,361, the present value of the prospective profit—making a total sum of £231,821. He further calculated that in 1898, £4608 would be required for retort-benches, &c.; in 1906, £15,400 for an additional gas-holder; and in 1914, £6900 to bring into use a portion of the retort-house. There would also be some other small expenditure on additional purifiers, and other minor items. In 1928, the estimated price of gas would be 33·21d. per 1000 cubic feet, with a slight extra charge for the use of meters.

In cross-examination, witness said he could not call to mind any company of the standing of the Chesterfield Company charging their maximum price and having no reserve fund; nor one which, having charged their maximum price for years, were not paying near their maximum rates of dividend. He knew that the Company had power to raise a reserve fund amounting to 10 per cent. of the capital.

Mr. LITTLER remarked that the Company had a reserve fund of only £100, *plus* its accumulated interest.

In further cross-examination, witness admitted that several large factories in Chesterfield had installed the electric light in place of gas. Still, the consumption of gas had increased. The figure of 59 million cubic feet represented what was made in 1895; but he could not say what was actually sold then.

Mr. LITTLER said in 1891, when 51,545,000 cubic feet of gas were made, there was a leakage of 2,517,000 feet—that amount being unaccounted for; but in the next year, when 54,177,000 cubic feet were made, only 1,189,000 cubic feet were set down as unaccounted for. A subsequent year, when the manufacture was 55,800,000 cubic feet, the loss was 2,142,000 feet. None of this was used at the works as there was a special heading in the accounts for gas consumed in this way.

Witness said the difference might be due to the time the meters were checked not exactly corresponding in each year. The two gasholders of the Company had a capacity of about 450,000 cubic feet.

In reply to Mr. WOODALL, witness said he did not propose to treat the capital invested in the old works, when their use was discontinued, in any special way, because they would still be available if required. The purifiers in the old works had already been discontinued; but he did not know if they had been written off the capital account.

Mr. WOODALL: Can you say what will be the amount of the annual charge upon the purchasing body for interest and sinking fund, if the £231,000 at which you value the undertaking is paid?

Witness: I have nothing to do with that; and, with all due respect, I take it that this tribunal has nothing to do with it, because they are sitting to ascertain what the value of the undertaking is to the sellers, who are compelled to sell. Whether the buyers make a profit or loss is not, I think, pertinent. The purchasing authority is not considered.

Mr. *Thomas Newbigging*, M.Inst.C.E., stated that he had had forty years' experience of gas-works. The gas-works of the Chesterfield Company were in good condition, very substantial, and having regard to the new works, there was a large margin for extension. With a slight further expenditure, about two-and-a-half times the present quantity of gas manufactured could be made. Looking to the general condition of the concern, he thought 28·57 was the proper number of years' purchase to apply. His initial figure, which represented the profit for 1894 adjusted according to his ideas, was £5450 9s. 5d. It differed very slightly from Mr. Hawksley's estimate. He adopted Mr. Hawksley's figures in general, including the item of £61,361 for prospective value. In calculating the value of the business, he had had regard to the position of the sellers—ignoring the buyers altogether.

In cross-examination, witness said that both old and new works were in good condition. The sulphate plant was scarcely part of the gas-works. He could not agree that the old works should be swept away. In order to extend the works, so as to be able to make two-and-a-half times as much gas, about £280 per million cubic feet to be manufactured would have to be expended. In other cases of this kind, he had suggested 28·57 as the multiplier, and had it allowed.

Mr. *W. A. Valon*, Assoc.M.Inst.C.E., Past-President of the Society of Engineers and of the Incorporated Gas Institute, in a sentence, expressed general agreement with Mr. Hawksley's views.

Mr. WOODALL: Did you ever make a claim for prospective value against a gas-works before?

Witness: No; but I think this particular case is not on all-fours with any other that I remember. In the present instance, for example, the capitalized profits do not represent the large margin of works which are ready to hand by a comparatively small expenditure. Therefore, I think, this should come under the head of prospective profits.

Mr. *H. T. Gratton*, the Chairman of the Chesterfield Water and Gas Company, was called by Mr. CRIPPS, in order that Mr. LITTLER might have the opportunity of questioning him. The demand, he stated, for gas was not as great as it should be, owing to the extended use of oil, the early closing of shops, lack of enterprise, and other circumstances. The records showed that there had been complaints about the gas ever since the Company started. It was a fact that several large consumers had established electric installations. He knew Mr. Markham, who was a large employer, and his works. Mr. Markham had more than once threatened legal proceedings, if better gas were not supplied. He had now given up the use of gas. He was a large manufacturer of dynamos, which was a very good reason for his adopting the electric light. He did not know that Mr. Markham's men had had to have candles in addition to gas, over their machines. Witness always burned candles as well as gas. Asked if he had ever had any complaints that the price of gas was prohibitive, witness asserted that gas had been the subject of complaint at all times. He agreed that a considerable number of firms (the names of which were put to him) had given up gas in favour of electricity; but he stated that, in a few cases, they had spare engine power, which they were able to utilize in its production. In spite of this, however, the gas consumption had increased. On the ordinary capital, the dividend for the last five years had averaged over 5 per cent. In some cases, the rates proposed in the Company's Bill came out at 60 per cent. in advance of the present charges. When giving evidence in connection with the Bill, witness stated that, if the £100,000 extra capital asked for were granted, only £2000 extra per annum would be available for dividend; so that the shareholders would suffer—the only way the income could increase being by additional charges, or by the growth of business. The rating of the Company was too high; and they had appealed to the Assessment Committee, and failed. They did not take the case to Quarter Sessions. [Mr. Littler quoted at length from evidence given in reference to the Company's Bill, to show that the financial portion of their scheme was unsound, and in connection with other points; and witness expressed general agreement with his previous statements.]

Mr. CRIPPS read the minute of the Board, which gave as the reason for the rating appeal not being taken to Quarter Sessions that the Board did not wish to waste public money, though they considered the assessment unjust and excessive.

Witness further stated that he knew of no gas company that did not receive complaints. A Mr. Robinson complained of insufficient pressure from the mains; and at witness's suggestion, he put down new pipes. The pressure in his case even then was unsatisfactory, though in the immediate neighbourhood it was sufficient. One reason, perhaps, was that the pressure varied; it being required by statute to be not less than 8-10ths of an inch from sunset to midnight, and 6-10ths for the rest of the 24 hours. Witness knew of no instance in connection with the Chesterfield Company where the pressure had been under the statutory allowance. The mains were adequate; but he quite admitted that the pressure in some dwelling-houses was insufficient. This was due to causes unconnected with the Company.

Saturday, Feb. 8.

On the resumption of the proceedings this morning,

Mr. *Charles Hawksley* was recalled, at the request of Mr. LITTLER, and questioned with regard to the new gas-works of the Company. Referring to their character, he said they were intended exclusively for the manufacture of gas, and had nothing to do with mains.

Mr. LITTLER: Do you say that the Company's gas-works are entirely up to modern requirements in every respect?

Witness: Well, no doubt there have been some advances made in gas-works since those of the Chesterfield Company were constructed.

But are they practically up to modern requirements?—Practically they are. With regard to the retort-house, it is customary nowadays to use regenerative furnaces, though it is not the universal practice. Their use is contemplated in the fitting up of the second part of the new house; and provision has been made in the estimate of future expenditure for this purpose. If I might draw attention to a fact, or comment upon it, I would point out that the expenditure on these works—the retort-house and the new gasholder—was necessarily larger than usual, because the works were executed at a time when prices were very much inflated. Just then, for instance, cast-iron pipes were £8 per ton; and the prices of all things were in the same proportion.

Sir G. BRUCE: What was the cost of the works at present idle?

Witness: About £17,600.

For the retort-house and everything?—Yes. I include the retort-house and coal-shed, and the building in which the boilers are placed; but I omit the boilers themselves, for they are at present in use supplying steam.

Then £17,600 is the whole of the capital not productive?—Yes. It does not include any portion of the site; but it is possible that some pipes may have been laid to take the gas from the retort-house. I put the buildings at £10,350, and the ironwork connected with the retort-fittings at £5650; and then I add 10 per cent for the cost of supervision by the engineer, clerk of works, and so on, which brings the amount up to £17,600.

Mr. CRIPPS: That figure has reference to expenditure on the manufacturing works which up to the present time have not been used?

Witness: Yes, except a corner of them which has been utilized as a boiler-house. I have not included the cost of the boilers.

Mr. *C. E. Jones*, Assoc.M.Inst.C.E., General Manager of the Chesterfield Gas and Water Works, was then called by Mr. CRIPPS; but the

only evidence taken from him in examination-in-chief, was that he had been connected with the undertaking for 23½ years, and was familiar with all matters of detail concerning it.

In cross-examination by Mr. LITTLER, witness said he was present in the House of Commons during the inquiry into the circumstances of the Company in 1894. He believed he had heard the evidence of some of the witnesses who went before the Select Committee and made complaints with regard to the water supply.

Mr. LITTLER: That evidence was rather strong, was it not?

Witness: The allegations made were considered strong; but they were not founded on fact.

Are there no complaints in Chesterfield as to the operations of the Company which you would like to meet?—Well, we should like to impound more water. We want a little more.

Did you hear the evidence of the Town Clerk of Chesterfield?—Yes. He made some rather strong allegations; but, as we all know, town clerks are very imaginative. I remember Mr. R. A. Hornagold giving evidence in 1894. He was Secretary to the Trade and Labour Council of Chesterfield; and he spoke to that body passing a resolution on April 12, 1894, to the effect that the conduct of the Water and Gas Company in the past towards the consumers—and more especially with regard to the treatment and supply of the poorer tenants—had been such as deserved condemnation and the strongest opposition on the part of the Corporation as the representatives of the town and ratepayers generally. They therefore trusted that the Corporation would use every possible effort to prevent the passing of the Company's Bill in its then form, and certainly the proposed increase in the water charges. Mr. Hornagold had said that small fish sometimes came from the service-pipes, and that sometimes the water supplied to the dwelling-houses was dirty. Fish got into the service-tanks, and bred there; and occasionally one might find its way into a pipe. As to dirty water, that would be owing to a disturbance through drawing off the water in the works.

Have you refused to supply water to closets?—Not when the application has been legally made.

Do you know that there are cases in which, after water-closets have been constructed, people have had to take out the fittings, because of your refusal to supply water?—No, I do not know of that; but I know that many people in Chesterfield have a strong objection to water-closets in cottage property.

One of the reasons you gave for your refusal to supply water to closets was that "unauthorized" plumbers were engaged?—Well, we do object to the employment of incompetent people.

What right have you to "authorize" plumbers to do the work? You have no authority to select your own plumbers?—Perhaps so.

But that is what you have done?—We had a set of regulations drawn up (copied from Sheffield by the Chairman chiefly), and they were sent to all the architects of the neighbourhood, and the plumbers, &c. No objection was raised to them. We worked under these regulations; and until a recent period, we had no objection raised except by the Chesterfield Corporation.

You have insisted upon having plumbers of your own selection employed?—We have insisted upon competent men being employed.

They must be men of your own selection?—I do not know of objection having been taken to a competent plumber.

Do you know a person named Facer?—Yes; and I am aware that he is interested in property at Whittington, and that before the Committee in 1894 he said that five of his cottages were deprived of water. The fact was that during the carrying out of some repairs or building operations, the main became broken; and when it was reported to us, we sent some men down who blocked it up. The main was damaged in January; and it was at the latter end of March, or early in April, that the repairs took place.

Mr. Facer stated to the Committee that he had made repeated applications to the Company to have the pipes repaired and the water laid on again; but that for a long time he could get no satisfaction out of them—the reply always being that the repairs at his houses would be attended to when other repairs in the same district were taken in hand?—The facts of this case are these: The people damaged the water-main while carrying out repairs. Our inspectors found out the leakage, and saw that the water was turned into the drain. We sent down and stopped the leakage, not the drain. We had no information from Mr. Facer himself as to this matter until we discovered the leakage ourselves.

Was not notice given to you by these people to supply the new houses with water? and did not a long delay take place before you complied with the notice?—There was a dispute about a communication-pipe in that case.

Do you not know that in three instances the Corporation took out summonses against people as test cases, for not complying with their order to convert privies into water-closets?—I do not.

Do you not know that persons were summoned?—I recollect hearing something about it.

Do you know Mr. Bowter?—Yes. We did not refuse to lay water on in his case. I believe they applied to have water laid on; but whether or not it was done, I cannot say.

Did Mr. Lomax apply?—I do not know. Mrs. Allsop's agent applied; and I know that in this case a summons was taken out, and was dismissed.

In this case was it not the fact that the defendants had tried all they could to comply with the order, but were unable to carry it out because the Company refused to supply the necessary water?—That is not a fair statement of the case. They told us it was a great shame that they should be harassed as they were by the Corporation.

Sir G. BRUCE: I hope Mr. Littler will not pursue this point further than is necessary.

Mr. LITTLER: I have nearly finished. (To witness:) Is it not a fact that in the case of a number of houses in regard to which the owners have given notice to the Company to lay on the water, no water has been laid on?—There has been no water laid on in many instances; but the fault has not been with the Company.

We shall see about that. On Jan. 31 last year, did not a Mr. Lack write to you saying: "We have had no water since Sunday last"?—I had some correspondence with Mr. Lack. He was without water for a short time. The Company gave it to him with as little delay as possible. I do not know whether he complained again; but if he did so in writing, he would be waited on. He may have complained a third time, and then have published the whole of the correspondence in the Press. There may have been 60 or 80 houses without water for periods of about a month at a time; but it was owing to the action of the frost.

Were you short of water last October?—In February, we wrote to Mr. Lack to say the Company's mains were full of water; and that any failure in the supply was owing to defective communication. He then came and paid the water-rate. We wrote to him to say that the supply was stopped for a period owing to the repairs that were taking place, in consequence of the damage done by the frost. We said the repairs would be effected as soon as possible. There was no trouble about the water supply in 1895.

Cross-examined as to the condition of the reservoirs, witness said that on Oct. 15 there were 9 ft. 11 in. of water in the upper reservoir, and none in the lower one. On Oct. 30, the upper reservoir was down to 6 ft. 1 in.; on Nov. 2, to 3 ft. 11 in.; and on Nov. 5, it was empty, while there were 2 feet of water in the lower reservoir.

Mr. LITTLER: Is it not the fact that for weeks before Oct. 15 the supply had been intermittent, and that in some cases the consumers were three or four days without water?

Witness: No district has ever been without; and there are certain areas which had a constant supply during the drought.

But in some cases, were not people three or four days without water?—No doubt that was so in some instances, where there were fractured mains in consequence of the frost. Witness went on to say that the Company's mains were laid at a depth of from 2½ to 3 feet, after the experience they had had with the frost in recent years. The Health Committee of the Corporation had written to the Company complaining of the water supply, and asking if they would join them in the expense of opening up the old town wells, which might be necessary for the health of the population. The Company, he was told, wrote to the Committee acknowledging that there was a difficulty, and stating that they would do all they could to cope with it. He was not responsible for that letter being written. But the Town Clerk spoke to such a communication having been received; and he accepted the Town Clerk's statement in the matter.

What is the greatest depth of water in your service reservoir?—From 12 to 13 feet. Its capacity is 5,750,000 gallons.

Has it ever been full?—Yes; frequently of recent years. The fall of the water from the Club Mill reservoir is 390 feet. We cannot, by reason of the overflow outlet, fill the reservoir up to the height of the inlet.

Have you ever filled it up to the height of the overflow?—Yes.

How much is the level of the water below the overflow usually?—Generally the reservoir is from half to two-thirds full—that is to say, it has from 6 to 9 feet of water in it.

The reservoir is frequently from 12 to 13 feet below the level of the inlet?—When the reservoir is out of action.

Is it not a constant subject of complaint in Chesterfield that you do not fill your reservoir, and that the consumers cannot get water up to the first floors, and have to use jugs to carry it up for the purpose of flushing the closets?—No complaints of that kind have come to us.

Is it not a fact that the reservoir is never allowed to get full for fear of leakage?—No; I cannot admit that the reservoir leaks.

We say it leaks, but that you take care not to see it, never filling the reservoir. Has not Mr. Todd complained to you more than once of want of pressure?—Yes.

He has complained to you that he has never been able to get water for his closet?—Yes.

Is it not a fact that his closet is below the level of the intake of the reservoir?—The builder of the houses, to save the expense of laying pipes to connect with the high level, connected with the Club Mill main. That served him for building purposes, and for the ground-floor of the houses; but it did not enable him to lay on water to the upper floors. But the Company, after considering the circumstances of the case, thought there was some reason in the complaint; and they brought down the high-level main for communication purposes.

Would you be surprised to hear that even now these houses have no water on the upper floors?—Then it is stopped by the communication-pipes. The houses should be on the high-level main.

With regard to gas, is it not the fact that fifteen times in a single month the Corporation were unable to test the quality because of want of pressure?—I imagine that the parliamentary pressure was kept up notwithstanding that.

How many lights will a 2-inch pipe supply?—That depends on the pressure.

Well, with a decent pressure?—We should be satisfied if we got 100 lights.

Assuming that you had a decent pressure, how many lights would the pipe supply?—We should not have more than 100 lights in a factory.

How many yards of 2-inch main have you got?—We have 7348. We supply gas at a distance by that means.

In re-examination by Mr. BRAY, witness said that in the case of Mr. Facer, the communication was stopped when the broken pipe was discovered—probably by knocking up the leaden service-pipe. That would be in accordance with the usual practice in such cases, to prevent waste of water. The district in question was a thickly populated one. Notice would be given to the people when the water was cut off to get their supplies from the street-taps. His impression was that the houses in question were not populated; but they may have been. Like every other town, Chesterfield suffered from the frost; but they suffered less from broken pipes than their neighbours. Taking the mileage of pipes in the two places, they had very few pipes broken indeed compared with Sheffield. He had said something in an interview with a reporter as to insufficiency of water; his object being to get the public to stop waste.

Mr. BRAY: Perhaps you exaggerated the condition of things?

Witness: I used language which I hoped would have the desired effect on the ratepayers.

With regard to the height of water in the reservoirs, are the reser-

voirs ever empty?—The two are never empty together. The Club Mill reservoir will supply nearly the whole district, though we have three reservoirs, including the middle zone and the high pressure. With regard to gas, when Mr. Robinson put his communication down, his works were a good deal smaller than they are now. They have been largely extended of late; and I think his service-pipes are not large enough.

In answer to Mr. WOODALL, witness said they had proper apparatus at the works for gas-testing, which the Corporation could use if they chose. The testing in some cases had been done by a police constable. Unless testing was properly carried out, some very extraordinary results could be obtained.

Mr. BRAY said that concluded the case for the Company.

Mr. LITTLER then addressed the Court for the Corporation. He said the Chesterfield Water and Gas Company had been in existence, in their present form, since 1855; so that in their operations, with one or two exceptions, they were in advance of legislation. The Company seemed to have given moderate satisfaction for some time; and at one period they got into such a position that they paid their maximum dividend, and one year, paid 18½ per cent. of back dividends. But from that time onwards, both in regard to the water and gas undertakings, they had done nothing but go backwards. In 1878—nearly twenty years ago—they paid this 18½ per cent. of back dividends; and they continued to pay full dividends, but no back ones, until 1880. This might be emphasized by referring to the two previous years. In 1877, 20 per cent. back dividends were paid; and in 1876, 10 per cent. So that in three years, back dividends were paid to the extraordinary extent of 48½ per cent., in addition, of course, to the full dividends on preference stock (10 per cent. or £21,000), guaranteed stock (£8000), and ordinary stock (10 per cent. or £11,200) and 7 per cent. on new shares. Things then grew worse; and in 1885, the dividends fell to 4¾ per cent., whether nominal 10 per cent. or 7 per cent.—everything except guaranteed preference stock. In 1886, the Company dropped to 4¼ per cent. They then got up to 5 per cent. until 1891; and in 1892, they reached 6 per cent. Then they dropped in 1893 to 5½ per cent., after which, with the certainty of the undertakings being purchased, they rose to 6¼. In that year, there was a distinct absence of a proper application of the money; and there were two striking circumstances which, having regard to the way in which evidence had been given both by the Chairman and Mr. Jones, made one very suspicious—for they were told that the accounts were not made up, and would not be ready for a fortnight. Contrary to universal practice in connection with well-managed companies, this Company, in 16 years—having not only paid for two years their maximum dividends, but also 48 per cent. by way of back dividends—suddenly came to the position that they could not touch all their dividend. It was said that the Corporation should pay 33½ years' purchase for the water undertaking; and this on calculations which confessed that the Company dared not put any increase on account of prospective profits. With an insufficient dividend, they asked the Arbitrators to deal with the annual value as of the same rate of interest as Consols stood at before Mr. Goschen's Act. Why, this was not a first-rate security, nor even a second-rate one. It was no better than third-rate, for it was a security in a Company whose receipts had not only been diminishing, but whose management had also been going back. Who out of Chesterfield would buy Chesterfield gas and water shares? Until now, there had never been a thorough examination into the affairs of the Company; for the parliamentary inquiry in 1894 was only in regard to the water undertaking, and even as to that, it was only partial. And after this inquiry, would anyone think of buying shares in the Company, if he could get shares in other concerns of a similar kind? He ventured to say that, with the sole exception of the New River—which was real estate, and a fancy purchase—there was no case in the kingdom where a water company had shares which were at the price claimed for those of the Chesterfield Company. This being so, were the Arbitrators to give more than the rate at which a gentleman could invest in a reasonably secure undertaking of the same description? He protested against the continual dragging in of Consols; and was wearied with references to rating and compensation cases. The allegation was that, if they turned a man out of an investment he was in, he was so hurt in his feelings that he must be allowed compensation—that if they took from him an insecure investment, they must allow him enough to obtain a secure one. This was an absolute absurdity; and while asking for enormous compensation, the Company said there was no prospective value in the undertaking. It was suggested that an additional 10 per cent. should be put on the value of the undertaking in consideration of compulsory purchase. Well, was it a compulsory purchase? After all, however, the 10 per cent. claimed was very light refection compared with the heavy feed that was given to the Court in the figures put before them in reference to the purchase. Therefore, if it had not been that his learned friend Mr. Cripps had been dreadfully pressed, he would not have dealt with the question of compulsory purchase at such enormous length. This subject, his learned friend had made almost the principal matter of his speech. As a general rule in cases of this kind, legal gentlemen went through all the figures; and then said in conclusion—"and then you must add 10 per cent. for compulsory sale." In this case, however, they had had several pages of arguments—arguments set up for the sole purpose of establishing the principle of compulsory sale. It could not be compulsory sale, unless the Corporation wanted to acquire the undertaking. But they did not want it. They were at present unhappily in the position in which the poor rates and the municipal rates amounted to 8s. 4d. in the pound; and they did not wish to increase their responsibilities. There was nothing they desired less than to buy the water-works.

Sir G. BRUCE: You are separating the water from the gas.

Mr. LITTLER said the Corporation did not want to buy the water, and still less did they wish the gas-works. They had never proposed that they should buy the latter; all they had said they were willing to do was to take over the water undertaking. But the Committee of the House of Commons, impressed by what had been put before them by Mr. Bidder, imposed on the Corporation the obligation of purchasing the undertaking as a whole. They had never offered to buy the concern; but when the Chairman of the Committee announced the decision to throw out the Bill, the Corporation submitted to the terms put upon them. They not only did not want to buy then, but they did not want to do so now. He had put this question to Mr. Cripps: "Will you keep your gas?" and the answer given had been: "We will not." Was that compulsory purchase? It was said that this concern, which had only cost £90,000, had a prospective value of £60,000; but even that did not tempt the Corporation. He had said to Mr. Cripps: "You can have your gas;" and he understood his learned friend to reply: "No thank you." The accounts of the water and the gas undertakings had been kept separate; and there was no earthly reason why the two concerns should not be separate. Yet when the Corporation said: "Separate the two, and keep the gas; we never wanted it, and do not want it," the Company would not listen to them. Chesterfield was an old town; and as in the case of all old towns, however well advised the Corporation were, the rates increased. Therefore they did not want to add to their burdens unnecessarily. A further reason why they should not desire to purchase the gas undertaking was that they had promoted, and obtained, a Bill to enable them to supply the electric light. The people of the town, from the richest to the poorest, were all crying out as to the abominable way in which they had been treated by the Water Company, who, when they went to Parliament for £190,000, proposed to increase the rates from 180 to 190 per cent. What were the Corporation to do, when the Company went to Parliament? They could not stand still. They were bound to appear, and assert that the Company were neither able nor willing to supply the town; and there was a popular outcry against the Company, and in favour of the Corporation. The Labour Council—which represented nine-tenths of the population of the town—declared that the state of things was absolutely intolerable; and though it was true that the rates of the town were 8s. 4d. in the pound, there was no option left to the Corporation but to put an end to the Company. They did not want, like another large body with which Londoners were acquainted, to control the gas, the water, the police, the tramways, the steamboats, the docks, and everything else. They desired to leave the Company alone, to get on in their own way; making money if they could. But they were driven by the gross mismanagement to endeavour to relieve them of the water supply—water being a necessity of life. They had given strong evidence before Parliament of the gross mismanagement which had taken place; and having done so, what was their argument? It was this: "Do not give the Company any further parliamentary powers, because if you do, and we have to buy the water, they will claim a certain number of years' purchase, and everything else; and they will say that they have got the power to increase their rates, and so the property is worth much more." They might not, of course, have expended the money in extensions; but they would have got their increased rate at once if the Bill had passed. The whole of the burden of the song of the Corporation therefore was: "Do not increase the powers of the Company, because the sole subject they have in view—especially after they are willing to sell—is to increase the amount which an Arbitrator might be disposed to give them." Not only did the Corporation of Chesterfield take up this attitude; but Brimington, Newbold, and all the other places, joined with them in opposing the Bill. They were all groaning under the mismanagement and incompetency of the Company; and when they had made out their case—without being able to get the Manager of the undertaking in the box—what was the result? Why, when the other side found that the Corporation were determined not to submit to the proposed enormous increase in the rates, they said they were prepared to sell. The learned Counsel then referred to the shorthand writer's transcript of the proceedings before the Select Committee of the House of Commons, to show that, so far from this being a compulsory sale on the part of the Company, it had been forced upon the Corporation by the misdoings of the Company.

Sir G. BRUCE asked what the finding of the Committee was.

Mr. LITTLER said that the Committee refused the application made to them by the Company, and decided that the purchase should take place under the Lands Clauses Act of 1845. It was for the Arbitrators to say whether or not the sale was compulsory. He could not admit the contention of the Company in regard to an allowance to be made in assessing the value of their undertaking in reference to excessive rating. The Chairman of the Company was himself a solicitor, and knew very well what rating was. The Company had gone before the Assessment Committee, but had not obtained the relief desired. They had actually paid the Surveyor's charges, but had never appealed to Quarter Sessions. Was it at all reasonable to suppose that a Company who found it necessary to go to Parliament for new powers to enable them to increase their charges, would have consented to pay £1200 a year more in rates than they ought? The actual disbursements must be taken by the Arbitrators as they found them. As to the argument based on the view that the Company should be allowed to pay back dividends, he pointed out that they had no more right to pay such dividends than they had to pick people's pockets; and the same thing applied to the existing mortgage debt. Then the calling up of fresh capital was a matter of prospective value; and who was going to invest in new shares when they knew that, so far as the water undertaking was concerned, the Company were not able and willing to carry it on, and the Corporation might at any moment be allowed to compete, when the Company would require every penny they could raise? Looking at the thing broadly, the case of the Company was a piling up of all sorts of prospective possibilities. Their attempt was simply to bolster up a concern which had been grossly mismanaged.

The further hearing was then adjourned until the 20th inst.

Gaseous Firing at Leominster.—The Leominster Gas Company have decided to adopt gaseous firing, and have placed the order for a new retort-bench to manufacture the whole of their output, together with a new retort-house, &c., with Messrs. R. Dempster and Sons, Limited, of Elland.

The Cost of the Salcombe Water-Works.—A statement recently laid before the Salcombe Urban District Council by the Clerk shows that the works of water supply lately inaugurated in that town cost £4105. Of this amount, £3900 was raised on loan; and the balance of £205 is to be paid out of revenue.

ROCHDALE CORPORATION GAS SUPPLY.

The Price of Gas—Special Recognition of the Engineer's Services.

Some interesting business in connection with the Gas Department claimed attention at the last meeting of the Rochdale Town Council. First in order, was a recommendation of the Gas Committee that the price of gas should be reduced to consumers outside the borough to 3s. 2d. per 1000 cubic feet for lighting purposes (leaving it 3d. more than the price charged in the borough), and allowing the same scale of discount as inside the borough; and that, for purposes other than lighting, the price should be lowered to 2s. 6d. per 1000 feet, making it in this case 6d. more than inside the borough. It was explained by the Chairman of the Committee (Alderman Petrie) that the reductions were 2d. for gas used for lighting, and 3d. in the case of that consumed for other purposes. The former reduction would really amount to more than 2d., because it was proposed to give customers the benefit of the same rates of discount as were allowed in the borough; the discount to outside districts having hitherto been very small. If the consumption continued at the present rate, the revenue which would be lost by the reduction would amount to about £500 a year; but the Committee hoped that, as the price was less, a greater amount of gas would be used. The recommendation was passed.

The next proposal introduced by Alderman Petrie was that the salary of the Gas Engineer (Mr. T. B. Ball) be raised from £450 to £500. The largeness, importance, and responsibility of the work connected with the gas undertaking was referred to by the proposer, who assured the Council that the Committee would have no rest and would feel no security unless they were satisfied that they had at the head of their staff a man of skill, of experience, of business ability, and, he might add, of sterling honesty, and one under whose care they could rest assured that the gas-works would be well overlooked and well managed. They had all these qualities in their present Manager. The Committee were of opinion that the remuneration which Mr. Ball at present received was not adequate, considering the work and the responsibilities which his post entailed upon him. Some information was sought by members as to salaries paid in other towns; and Alderman Petrie having satisfied them, the proposition was agreed to.

The question of giving Mr. Ball a well-earned honorarium for the special services he has rendered lately in connection with the gas-works was next considered. The recommendation of the Committee was that, "in consideration of the large amount of extra work that has devolved upon Mr. Ball in carrying out the new extensions at the gas-works, the Council pay him the sum of £100." Alderman Petrie said they had raised Mr. Ball's salary because of his increased and more important work. In addition to his ordinary routine work, he had had, as they knew, a very great deal of extra labour in connection with designing and superintending the large extensions that had been made. He might say that they had employed no architect. Mr. Ball had done the work, and had thereby saved them great expense. They had all the more confidence in proposing this grant because of the very satisfactory manner in which every part of this extra work had been carried out. These remarks were greeted with applause. Among the members supporting the recommendation was Mr. Whitworth, who said Mr. Ball had had the spending of between £40,000 and £50,000 during the last three years; and, in addition, he had prepared all the plans and designs, thereby saving a lot of money. If they had employed an architect, they would have paid 3½ or 4 per cent. for the work which they had now had free. The Mayor (Mr. J. Turner) added his testimony as to the work Mr. Ball had accomplished for the Corporation; and stated that, by taking it upon himself, Mr. Ball had saved them something like £2000 in the past few years in the way of architects' fees alone. The recommendation was passed with only a few dissentients—those objecting doing so on the ground that officials in other departments had not received any pecuniary acknowledgment for extra work; but, of course, each case must be decided on its merits.

WALSALL CORPORATION GAS SUPPLY.

Gas Committee's Annual Report.

At the Quarterly Meeting of the Walsall Town Council on Monday last week, the Gas Committee reported that the statement of the Borough Auditor on the working of the gas undertaking for the year ending Dec. 31 last had been submitted to the members. The net profit amounted to £7125, which was £2159 less than last year, but this was accounted for by the reduction in the price of gas of 2d. per 1000 cubic feet which was made last year, and the allowance of a discount of 2½ per cent—these two items representing together about £3100. The sum of £5000, part of this profit, had already been carried to the credit of the borough fund, in relief of the rates; and the balance, amounting to £2125, the Committee recommended should be transferred at the end of the current year to the gas-works reserve fund, which would increase it to £11,832, which the Committee considered to be very desirable, having regard to the fact that the gas-works capital now amounted to £164,693. When the Local Act of 1876 was passed, it was contemplated making the fund £10,000 within ten years of the passing of the Act; but although nearly twenty years had passed, the fund had not reached the prescribed amount. The Committee felt that the profit earned justified them in assuming that they would during the current year be again able to transfer to the relief of the borough rates a similar amount to last year—viz., £5000—and they had notified to the Finance Committee accordingly. They recommend that the discount allowed on gas accounts paid at the gas office within one calendar month of the delivery of the demand note be increased from 2½ to 5 per cent. from July 1 next. The effect of this allowance would be to make the price of gas equivalent to 2s. 4½d. per 1000 cubic feet. The Borough Auditor's report was attached, and stated that the amount of profit for the year was £7125, as against £9285 the previous year. The gas sold during the quarter amounted to £12,850; being an increase on the last quarter of £273. Councillor Brownhills, in proposing the adoption of the report, stated that in 1883 243,178,000 cubic feet of gas were manufactured; and in 1895 136,574,000 feet more. The recommendations were adopted.

ELECTRIC LIGHTING NOTES.

The Worcester City Council have passed a resolution authorizing an application to the Local Government Board to sanction a further loan of £5000 for electricity purposes. The first annual balance-sheet and report of the Committee will be in the hands of the Council before their next meeting; and Alderman Williamson says he believes the members will be very "pleasantly surprised" by the result.

The accounts for 1895 of the Yorkshire House-to-House Electricity Company, Limited, whose operations are confined to the city of Leeds, show a gross profit for the past year of £6780; and of this sum it is proposed to set aside £3300 for depreciation and reserve, and to devote £2665 to the payment of a dividend of 5 per cent. on the ordinary share capital. The Company, with an output of 524,629 units, have achieved the result of breaking the "record" total costs of the United Kingdom—hitherto held by Manchester with an output of 1,168,382 units—the 1895 total costs at Leeds having amounted to 2·05d. per unit, as against 2·17d. in the case of Manchester in 1894.

The Bradford Town Council last Tuesday authorized the presentation of a memorial to the Local Government Board for power to borrow £40,000, required for the extension of the electricity works, and accepted the tender of Messrs. Siemens Bros. for the supply of two dynamos required at the proposed new electricity works in Valley Road, for £2650, and the tender of Messrs. Willans and Robinson for two 600 indicated horse-power steam-engines, for £4400.

At Newcastle, the Electric Lighting Company have had an increased demand for current in the past year; 471,662 units having been supplied, as against 431,239 units in 1894. The gross earnings were £4302; and the payment of a dividend is proposed at the rate of 4 per cent. per annum for the half year ending Dec. 31, which, with the interim dividend, makes the return 6½ per cent. for the year.

The members of the Halifax Town Council visited the electricity works last Wednesday, when a new engine (which has cost £3000) was started by the Mayor, Mr. G. H. Smith. Speaking in the course of the proceedings, Alderman Woodhead stated that they were now in the second year of their working, and were supplying 5000 lamps. The electric light works would be a paying concern as soon as they had a demand for 5500 lamps; and every 1000 lights they supplied in excess of that number would represent so much profit. In the three previous engines, they had a total of 500-horse power; but in the new machine, this power had been more than duplicated. The money borrowed was now well-nigh expended; and they had invested about £40,000 in the installation and mains. There had been some complaints as to the cost on the part of the consumers; but in many cases the excess was due to defective lamps. He further mentioned that the loss on the works in the present financial year was about £1300.

Revolver Outrage by a Gas Worker in Liverpool.—A man named Joseph Woods, who had been employed for some time at the Athol Street works of the Liverpool Gas Company, was discharged, with other men, by the Manager (Mr. C. J. M'Ewan) last Friday week. On Tuesday, Woods went to the works, and, it is asserted, threatened Mr. M'Ewan. In order to remove him, an officer was sent for; and Police-constable 100D arrived. When he attempted to remove Woods, the latter drew a revolver, and pointed it at the officer. Before, however, he had time to pull the trigger, the officer closed with him, and succeeded in securing the revolver. The weapon on being examined was found to be loaded in all its six chambers. Woods was taken into custody, and locked up on the charge of threatening to shoot Mr. M'Ewan and attempting to shoot the officer. Next day he was brought before the Magistrate (Mr. Stewart) at the Dale Street Police Court. Evidence was given to the above effect; and it was stated that, when charged with threatening to shoot, prisoner remarked, "Yes, and I will do it yet." Mr. M'Ewan, however, declared, in answer to the Magistrate, that he did not hear prisoner threaten to shoot him. As regards the threat towards the officer, the Magistrate said that, as the prisoner did not pull the trigger, the case did not come within the category of indictable offences. Mr. Neale, on behalf of the prisoner, expressed sorrow that, owing to drink, he had acted as he had done. Mr. Stewart ordered the prisoner to be bound over in two sureties of £10 each to be of good behaviour for six months, or in default to go to prison for three months.

Mr. G. Webster's London Water Scheme.—At a meeting in London of the creditors connected with the failure of Messrs. G. Webster and Co., of London and Melbourne, Mr. Biddle, on behalf of the debtors, said many questions were being put in respect of Mr. Webster's scheme for supplying London with pure spring water from his estate in the Colne Valley. There was undoubtedly a free spring which produced a great volume of water, and always gave a constant supply. Mr. Webster had formed the opinion that this spring was extremely valuable; and he had consequently spent a considerable amount of money in pumps and other plant. About September, 1894, he was approached by certain gentlemen who desired to take over the water rights of this spring; and a contract of sale was entered into. If the terms had been carried out, Mr. Webster would have been well compensated for his expenditure. For the goodwill, they were to pay £3000; and for the construction of the reservoir, &c., £6500. He was to receive another £2500 for the goodwill in respect of the works, and £12,000 for the plant. As to the land, &c., and incidentals, it was to be leased at £60 per annum. The formation of the Company was delayed by unforeseen difficulties; and when it was proposed, the response was not quite so satisfactory as had been anticipated. Mr. Webster was then offered £14,500, and £10,000 in fully-paid shares; and the money for the well and reservoir was to be payable only when he had commenced to supply water, or an Act of Parliament had been obtained or the Company amalgamated with some other. Difficulties again arose as to carrying on the business; but if certain complications which had arisen could be overcome, a satisfactory arrangement was possible. At any rate, the Company's property at Springfield was a very valuable asset in the opinion of Mr. Webster, who proposed to pay 20s. in the pound on liabilities amounting to £204,563.

WEST MIDDLESEX WATER-WORKS COMPANY.

A Special General Meeting of this Company was held last Tuesday, at the Offices, No. 19, Marylebone Road, for the purpose of considering a Bill proposed to be introduced into Parliament to authorize the construction of new reservoirs at Staines and other works for affording an additional supply of water for certain districts north of the Thames. Sir W. H. WYATT presided.

The SECRETARY (Mr. F. H. Wybroo) having read the notice convening the meeting,

The CHAIRMAN called upon Mr. Hollams, the joint Solicitor of the three Companies promoting the Bill, to explain its provisions.

Mr. HOLLAMS stated that the Bill, which was being promoted by the West Middlesex, New River, and Grand Junction Water Companies, proposed to form a Joint Committee, composed of three Directors of each of these Companies. This Committee was to be empowered to construct reservoirs above Staines, and take water from the Thames for the purpose of supplying those reservoirs when the river was above a certain height; and the three Companies were to be entitled to an equal share of the water so taken and stored. The money required for the purposes of the scheme—estimated at £1,000,000—was to be raised by debenture stock, which could obviously be obtained at an expenditure not exceeding £30,000 a year—say, at 3 per cent. The interest on the debt was to be equally shared, together with the working expenses, by the three Companies, unless one of them wished to take less than one-third of the water, and the other two desired to take more than one-third each, in which case the expense was to be borne in proportion to the quantity of water taken. This was a general purview of the Bill. In addition to providing for the formation of a Joint Committee, the Bill contained formal clauses with regard to the Committee, one of which was that, in order to form a quorum, one at least of the Directors of each Company should be present. Then, in case of a difference of opinion between the Companies, a standing Arbitrator was to be appointed to settle any such differences. The Bill also proposed to give the Joint Committee authority to acquire the necessary land and to construct the works set out in detail, and to take water from the Thames when they could do so without reducing the flow over Bell Weir in any one day below 250 million gallons. The effect of taking the water from the river in the way provided would be to ensure a greater flow of water over Teddington Weir than there was now; and consequently it would operate as a protection to the public rather than otherwise. As many of the proprietors were probably aware, it appeared from the report of the Royal Commission on Water Supply that the normal flow of water in the Thames was 1350 million gallons a day; and it was almost ludicrous to suggest that, with such an enormous flow of water, it mattered whether a few million gallons more or less were taken for the purpose of the water supply. The storage of the water was to be shared by the three Companies in the manner already stated.

Mr. STANTON asked if he understood rightly that the interest on the debenture stock was to be shared equally between the three Companies in any event.

Mr. HOLLAMS replied that this would be so only so long as the Companies took the water in equal proportions. If one Company did not take any water, and the other two took the whole of it, they would have to pay the whole of the expense; but if one had no water and the other two took one-third each, then the three Companies would have to pay an equal share of the expense.

Mr. H. FOWLER inquired if the result of their being allowed to take water when the Thames flowed above a certain height only would not come to this—that for six months of the year no water would pass into the reservoirs.

Mr. HOLLAMS said this would depend on the flow of the river. The normal flow of the Thames was 1350 million gallons a day; but in times of flood, it vastly exceeded this quantity, and did mischief. It was therefore beneficial, under certain circumstances, to take the water, which was more than could be carried away by the present course of the stream.

Mr. FOWLER remarked that if, during the six winter months, there was a large excess of water, this might bring the average to what had been stated; there being a reduction in the quantity in summer.

Mr. HOLLAMS thought it must not be assumed that in the summer months there was a deficiency of water. At intervals, the flow became short; but this was not the ordinary state of things.

The CHAIRMAN then moved that the Bill be approved, subject to such additions, alterations, and variations as Parliament might think fit to make therein.

The DEPUTY-CHAIRMAN (Mr. E. Boulnois, M.P.) seconded the motion; and it was carried unanimously.

SOUTHWARK AND VAUXHALL WATER COMPANY.

A Special General Meeting of this Company was held last Tuesday, at the Offices, Southwark Bridge Road, for the purpose of considering a Bill proposed to be introduced into Parliament in the ensuing session, entitled: "A Bill to authorize the Southwark and Vauxhall Water Company to acquire lands, construct additional works, and raise additional capital; and for other purposes." Alderman Sir HENRY E. KNIGHT presided.

The SECRETARY (Mr. Montague Watts) having read the notice convening the meeting,

The CHAIRMAN said the Directors were presenting the Bill in pursuance of their policy of thoroughly carrying out the recommendations of the Royal Commission of 1893, and bringing themselves up into the line then laid down, so as to enable them fully to discharge their duties to the public by maintaining an adequate and excellent supply of water in their district, and meeting the growing needs of that district as the population might increase. In 1894, they had a Bill in Parliament as a first step towards fulfilling those recommendations. In that Bill, they obtained authority to construct storage reservoirs, extra engine power, and more filter-beds; and there was a condition laid down that the works should be constructed as speedily as possible. They had proceeded, as rapidly as the complicated and important nature of the works would allow them, to carry out the wishes and the intentions of Parliament; and although that Bill was only passed in 1894—and passed after great opposition from the London County Council, notwithstanding that the necessities of their district were so urgent—they had been enabled to complete one of the storage reservoirs, holding approximately 100 million, or actually 90 million gallons of water, which meant more than three days' supply for their district. And when he told the proprietors that previously they had only had storage to the extent of a day-and-a-half's supply, they would see what an important addition had now been made. Not only had they done this, but they had also set to work to commence a large storage reservoir at Stain Hill, to hold 300 million gallons. They had proceeded so rapidly that the whole of the site had been cleared; clay puddle walls were practically in from the clay below the surface to a level with the surface; and the Board would be accepting almost immediately a tender for the completion of the reservoirs. So that he looked forward confidently to their finding, within the next two years, that they had added 300 million gallons to their storage, which, roughly speaking, would give them storage adequate for another ten days' supply, and would make altogether fourteen or fifteen days' storage. Now, fifteen days' storage was what the report of the Royal Commission mentioned as the least which the Company ought to possess; so he hoped the proprietors would be satisfied—and he looked with confidence to the authorities being satisfied also—that the Directors had shown themselves to be full of energy and of determination to provide all the necessaries which the Company's business required them to provide. This provision, however, would only extend over a comparatively small number of years; and the Royal Commission had strongly urged the Company to provide for the wants of the community for at least 40 years. It was in order that this might be done that they were now going to Parliament; and they were doing so for two purposes. The primary object was that they might be enabled to provide the extra storage which would be required during the next 40 years, and which the Royal Commission said they must have. At the same time, he would point out that this would not have to be constructed immediately, but when the Directors saw a site which was available—and other Companies were seeking for available sites—and which met with the requirements of the Royal Commission of 1893; they considered it desirable at any rate to secure it. Thus, after the completion of their reservoir at Stain Hill, they would be enabled to commence, and to continue from time to time, the construction of another series of reservoirs on a new site, so as to meet the growing wants of the district. Their second object was to provide a source of supply so as to give them the extra quantity of water which the Royal Commission laid down as necessary for them to have. Parliament, in its wisdom, in 1894 passed a recommendation that the quantity of water to be drawn from the Thames by the different Companies should not exceed that which they were then taking; and, always respecting the wishes and recommendations of Parliament, this Company set themselves to work to carry out more closely and more fully the plan which they had placed before the Royal Commission in 1893, which was to obtain a very large auxiliary supply of water from wells. They laid before the Royal Commission a statement showing certain sites where wells might be sunk. On one of those sites, they had sunk a well which, he was happy to say, was giving a most unexpected yield, and would, they believed, give a great deal more water in future than at the present time. They also intended to sink wells in their own district, where they were advised they would obtain a considerable quantity of water. These sources, however, would not, in their opinion, satisfy the requirements of Parliament, having regard to the growing wants of the Company's district. Consequently they were going to Parliament for permission to purchase land in Middlesex, in the valley of the Colne, and to obtain water from chalk wells, which, they were advised by the most competent authorities in such matters, would yield them a very large auxiliary supply. Geologists told them there was a huge quantity of water in the chalk; and the Directors had selected that spot because they felt they could obtain an extra supply there—he did not mean an unlimited quantity, or anything that would be unreasonable—which, added to their present sources, would satisfy the requirements of their district without any jeopardy or detriment to the needs of the inhabitants of that particular locality. They were, in fact, going to do what had been done from time immemorial throughout the whole of the civilized world. Whenever a city had wanted water, it had looked about outside it, and had gone to the nearest source of supply. This had been done in the case of Glasgow from Loch Katrine, by Manchester from Thirlmere, and by Birmingham from Wales; while other cities had obtained their water supply from other localities—some of them near, and some of them farther away. Those were the two points upon which they were going to Parliament—to enable them to store Thames water, and give it in excellent quality and quantity to their consumers in consequence of such storage; and also to supplement that supply, because Parliament had told them they must take no more water from the Thames than at the present time. In thus going to Parliament, they had the greatest possible confidence. They had been successful in guarding the proprietors' interests for many years past, and had obtained every Bill for which they had felt it their duty to recommend the proprietors to let them go to Parliament; and in those Bills, they had been enabled to do their duty to the public as well as to their shareholders. He had not the slightest doubt that the powers sought would be granted, because the requirements of the case were so urgent, especially as regarded the extra water they were proposing to obtain from Middlesex. Last year they were attacked by the Thames Conservators and others, and were charged with taking—and no doubt they did take—many million gallons of water a day from the Thames; and during the drought, perhaps, they did at times pump more than some people thought was advisable, though that was a question open for discussion. In addition, they obtained a huge quantity of water from the gravel beds at the side of the Thames, as well as from their wells at Streatham. It was, however, urgent that new supplies should be secured; and if they were granted these powers, they could lay their

conduit within a very short period—in fact, the work could be done in less than twelve months, though the sinking of the wells might take a little longer. In obtaining a supply of beautiful water from the chalk in the Colne Valley, they would respect the rights of the district, and ensure that the flow of none of the rivers would be affected. There had been some talk at different times about the Staines scheme; and it had been contended that Staines was recommended by the Royal Commission as the only place where the system of storage which they urged should be adopted could be carried out. The fact of the matter was that the Royal Commission did nothing of the sort. They had three or four plans with regard to storage in the Thames Valley before them. They said that two of the schemes were useless for certain reasons, but that the third, under which it was proposed to take a site at Staines and there erect storage reservoirs, was a good one, and that reservoirs constructed on those principles would be entirely satisfactory. The Royal Commission, however, were never so indiscreet as to say that that was the only spot at which this could be done. The land would have been a gold mine to its proprietor, if they had been so unwise as to have compelled the Companies to go there. What they did was to lay down various conditions—namely, that there must be a certain sort of subsoil, that the reservoirs must be within a given distance from the Company's works—they made use of the words "As near your present works as possible"—and that the water should be taken at that point so as to keep the flow in the river as long as possible. Now, if they took the water at Hampton instead of at Staines, which they proposed to do, they would be keeping the flow in the river for another nine miles; therefore in that respect they were meeting the requirements of the Royal Commission. Again, they were erecting on land which had exactly the same description of subsoil as that recommended, where they could easily get at the clay, and construct their reservoirs with every facility. As to these being as near the intakes as possible, he would point out that at Hampton their works were within half a mile of the intake. It would thus be seen that on every principle upon which the Royal Commission thought it was desirable that reservoirs should be constructed, they had proceeded; and they had done something more, which had not been recommended. He alluded to the fact that they were taking water from the Hampton Reach, where Dr. Frankland informed them that it was purer and of better quality than in any other reach in the Thames. He gave that evidence before a Committee of the House of Commons in 1894; and he had on previous occasions stated the fact in evidence before other authorities. He (the Chairman) hoped the proprietors, when they heard people talk about the Staines scheme as the one recommended by the Royal Commission, would not be led away by any such intrepretation, because the scheme was only given as a sample of the way in which water could be stored. There was another point in connection with this matter which he wished to impress upon them. The construction of reservoirs at Staines would have necessitated a conduit between seven and nine miles in length, to carry the water to Hampton. For this Company alone, that conduit would have cost £20,000 a mile; or, in all, they must have spent about £160,000 before they could have brought a gallon of water from Staines to their filter-beds at Hampton. What would the proprietors have thought of their Chairman and Directors if they had thrown away £160,000, when they could construct reservoirs close to their own works? It was true that the land would cost a little more, if their present proposals were carried out; but this was a mere bagatelle in comparison with such figures as he had mentioned. The Directors would not be parties to spending money uselessly on a conduit of such dimensions. In going to Molesey, they would obviate the necessity of a conduit, except a short one which would pass under the river to the present works; and the Board would construct the works with the greatest possible regard to economy, in the most efficient manner—thoroughly carrying out all those principles which were laid down in the report of the Royal Commission, to which they attached so much importance, and which they were satisfied formed a safe basis to work upon. These recommendations were arrived at by competent and eminent men; and the proprietors might rely upon it that no authority in this country would be found to dissent or depart from them. He concluded by moving a resolution approving the Bill, with or without any modifications which Parliament might require or permit, and which the Directors should approve.

Mr. C. M. VIALLS seconded the motion.

Colonel MITCHELL asked if the Directors had any idea whether or not it was the intention of the London County Council to oppose the Company's Bill.

The CHAIRMAN replied that there would be much opposition. The policy of the Council, he added, was to oppose every Bill brought forward by a Water Company; and he thought that was done with the view of harassing and damaging them as much as possible.

Mr. WILLANS inquired how far it was proposed to bring the water to which the Chairman had referred.

The ENGINEER (Mr. J. W. Restler) stated that the conduit from Rickmansworth would be about eleven miles in length.

The CHAIRMAN mentioned that this would only necessitate a 30-inch main, costing something like £30,000 or £40,000.

The motion was carried unanimously; and the proceedings then terminated.

THE LUTON CORPORATION AND THE WATER-WORKS.

After being left in abeyance since 1888, when the Directors refused an offer from the Corporation of £120,000, the scheme for the acquisition by the Town Council of the Luton Water-Works was last year resuscitated; but the proposals have just been rejected by an overwhelming majority of the ratepayers. Various negotiations took place during 1895 between the Special Committee of the Council and the Company's Directors, and three or four reports were issued. The result of the conferences was that the Directors declined to accept a lump sum, but expressed themselves as willing to transfer their interest by a scheme based on the Swindon Water Act, 1894. The Company's capital is £50,000, of which £20,000 was subscribed in 1865 and £30,000 in 1880; and for about twenty years past the profits have sufficed to pay the maximum dividends—viz., 10 per cent. on the original shares, and 7 per cent. on the 1880 issue. The terms agreed to were that the Corporation should issue annuities guaranteeing the shareholders their maximum dividends of £4100 per annum for 56 years, at the end of which term they were to be redeemable at 25 years' purchase. The Committee anticipated that they would be able to set aside £858 yearly out of the profits of the concern to form a sinking fund for redemption. They engaged the Company's Engineer (Mr. W. R. Phillips) to report upon the condition of the undertaking; and he stated that everything was in good order, but that a new reservoir, to cost £6000, with a new engine and boiler, would be needed in a few years. The present storage capacity of the works is only 1,614,000 gallons—barely twice the amount of the average daily consumption. The Company proposed to retain the renewal and contingency fund (amounting to £3760), together with a sum of £1000 for rolling stock, for the payment of back dividends, on which about £5000 is at present outstanding.

On the 7th ult., the Council adopted, by 10 votes to 4, the Committee's recommendation to purchase; but it was stipulated by all the members that no further steps were to be taken until the views of the burgesses had been ascertained. To this end, a public meeting of ratepayers was held in the Plait Hall. There was a crowded audience, and some spirited discussion took place. The speech of the Chairman (Mr. E. Oakley, the Deputy-Mayor) dealt the scheme a deadly blow. As Chairman of the Special Committee, he had signed their report recommending the purchase; but he now stated that, after giving the matter further thought, he felt the risks would, to a great extent, outweigh the advantages for many years, and they should try to get better terms. Alderman Hucklesby moved a resolution in favour of the purchase; pointing out the prosperous state of the Company, and mentioning that the £5 original shares now fetch £15, and the second issue £9 each. Mr. Beck, in seconding the motion, said those were the only terms; but he thought the scheme had not been fairly discussed, and that the Council had not satisfied the public in neglecting to obtain expert actuarial and engineering opinion. They might complain of unfair charges; but no Government would ever rob water companies of their rights without giving perfectly adequate compensation. Mr. J. J. Wright, a County Alderman, moved an amendment against the acceptance of the Company's terms. He urged that the price was too high; that the Council had not made any investigation into the Company's works and accounts; that the consumers would not receive any benefits whatever; and that an immediate outlay of some thousands of pounds was needed. He said that, while the Company's expenses had steadily increased, the profits for the past four years had only averaged £4660; but the Corporation had based their hopes on a net revenue of £5000. Mr. G. W. Gilder, who seconded the amendment, maintained that the acquisition would cost them £332,000; for they would, he said, have paid £229,600 in annuities during 56 years, and have to provide another £102,500 for the 25 years' redemption. At Luton, the Corporation were only charged 4d. per 1000 gallons for water according to a clause in the Company's Act; and that was cost price. At Swindon, the Local Board were charged 1s. 3d.; and the ordinary consumer paid more than at Luton. On a show of hands, the scheme was defeated by an overwhelming majority, only 19 voting against the amendment.

What the next step of the Corporation will be remains to be seen; but the Company must shortly apply for fresh borrowing powers. The old Local Board inserted a clause in the Water Act in 1865, requiring the Company to transfer the undertaking to the town on the assent of two-thirds of the ratepayers; the price to be mutually agreed upon or settled by arbitration. There is a strong feeling in many quarters in favour of a reference to arbitration; but the task of getting the requisite majority is regarded as rather too formidable. One councillor proposes to offer the Company the market value of the shares—viz., £114,000—and add 10 per cent.; making a lump sum of £125,400. But it is very doubtful if the Directors will even consider such terms.

BRADFORD CORPORATION WATER SUPPLY.

Increase of the Engineer's Salary—The Recent Arbitration.

By a very considerable majority, the Bradford Town Council last Tuesday decided to raise the salary of their Water Engineer (Mr. James Watson) from £1000 to £1250. The increase was recommended by the Water Committee, whose Chairman (Alderman Holdsworth) spoke very highly of Mr. Watson's work. Their Engineer, he said, had not only earned the additional amount of money by extra service, but by the great care and ability which he had shown in regard to the construction of water-works. The advance was not larger than he deserved; and it was the best and wisest economy to pay a fair value for services received. Mr. Watson had saved the Corporation more thousands than he had received hundreds. The members all knew that the scheme he was carrying out was an improvement on the original scheme of their former Engineer (Mr. Binnie); and he might mention that, for their new water-works, the Birmingham Corporation had employed an Engineer for the special work of designing and carrying them out—Mr. James Mansergh—who was to receive 3 per cent. on the outlay, or £103,000, as his remuneration. Referring to the award in the arbitration case with Mr. T. E. Yorke in respect of property in the Nidd Valley, Alderman Holdsworth said that the amount of the award was a little more than the Corporation had expected, and included compensation for something which had not been reckoned on; but, on the other hand, the Corporation would not have to undertake works which they expected they would have had to carry out. There was some little opposition to the recommendation. An amendment was proposed that the minutes of the Committee be approved, with the exception of that referring to the salary; but it was defeated by 41 votes to 14.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

No official advance has been made in the matter of the introduction of carburetted water gas into the Edinburgh Gas-Works; but an unofficial publication was made in an evening newspaper on Tuesday of the opinions of various experts in America, which tended to show that, so far as the alleged poisonous nature of the gas was concerned, it was "entirely safe." Of course, the views were those of Americans; and, as such, should not themselves be regarded as "entirely safe." An opinion by one expert on this side of the Atlantic, would be more convincing than a dozen by even the best on the other side.

The Renfrew Town Council seem to be in doubt whether they should extend their own gas-works or obtain a supply of gas from Paisley. At a meeting of the Paisley Town Council on Tuesday, the following letter from the Town Clerk of Renfrew was read: "In the month of April, 1889, an inquiry was made by the Magistrates and Council of this burgh to ascertain if the Corporation of Paisley would entertain a proposal to supply this burgh with gas from the Paisley system; but the terms asked by your Corporation were considered by the Town Council to be too onerous. I am again asked by the Town Council to ascertain if your Corporation could not give the supply on easier terms. Our present requirements are about 13 million cubic feet. I shall be glad to hear from you as early as possible." The Paisley Council resolved to hold a meeting in Committee to consider the application. It will be remembered that, in December last, the Renfrew Corporation considered proposals for extension which would have involved an outlay of about £500; but they seem now to be of opinion that they could take their gas supply from Paisley at less cost. The proposal is to take practically the whole supply from Paisley, which would seem to point to the Renfrew Corporation giving up, to a large extent, the manufacture of gas in their own works. The capital they have invested in their gas-works is not large; and I should say that the questions for them to consider are the relative cheapnesses of the continuance of their own supply and of the procuring of it from outside, and whether the taking of a gas supply from Paisley would obviate the necessity for, or would not rather require, a considerable outlay upon mains to suit the new source of supply.

So far there is amity between the Police Commissioners of Millport and the Cumbrae Gaslight Company in the matter of the taking over of the Company's undertaking by the Commissioners. Last month the Commissioners sent a communication to the Company asking the appointment of a Committee to confer with a Committee of the Commissioners as to the terms of transfer; and this week it was stated that a reply had been received from the Company agreeing to the proposal. Three members of the Commission were appointed to meet the Directors of the Company. It would be a good thing for both parties if the same spirit should prevail throughout the negotiations.

Following upon the adoption of the Burghs Gas Supply Act by Dunfermline, the Town Clerk of the burgh, in terms of the statute, lodged the resolution of the Town Council with the Sheriff-Clerk at Cupar, for registration; and from the moment of registration—which was on Wednesday—the Act came into force. But on Monday, before registration, Provost Walker moved in the Town Council that they remit the subject to a Committee to consider as to opening negotiations with the Company. The motion was agreed to unanimously. In speaking to it, Provost Walker said that the poll they took was certainly a small one; but he thought they might consider the result highly satisfactory, because he was sure that all who were shareholders in the Company—and who were opposed to the resolution—recorded their votes. It was satisfactory also in that there was a substantial majority in each ward. The number who did not vote at all was large; but they must be held as acquiescing in the action of the Council. One of the magistrates is a Director of the Company, and another magistrate and a councillor are shareholders; and these three gentlemen intimated their intention not to act on the Committee.

I have hopes that the Town Council of Stirling will come to terms with the Stirling Gas Company, without displaying the unseemly hostility which is common in such transactions, and which was threatened when the subject of the Corporation acquiring the gas undertaking was mooted, now some years ago. It was reported at a meeting of the Town Council on Monday, that the Town Clerk had written to the Secretary of the Gas Company asking a meeting with the Directors or a Committee of them; and the Secretary replied that the Directors would meet with them. It was then resolved to call in the assistance of a man of skill to advise the Council Committee. The names of several gentlemen were suggested to the Committee; and they agreed upon Mr. J. M'Gilchrist, the Manager of the Dumbarton Gas-Works. Mr. M'Gilchrist accordingly met the Committee, and discussed the subject with them. The Council homologated what had been done; and they resolved, if it should be thought necessary, to hold a special meeting, after the conference between their Committee and the Directors of the Company, in order to determine what they should do next. I do not anticipate that the parties will be able to come to terms when they meet; but if they preserve the spirit they are in at present, there should be no difficulty in their arriving, after some negotiation, at a basis of settlement. The Corporation may be sure of receiving the most reliable advice from Mr. M'Gilchrist.

The Coatbridge Town Council are also to be moved in the direction of acquiring the undertaking of the Gas Company, which will make the fifth burgh in Scotland in which negotiations to that end will be in progress, or are in contemplation; but the author of the movement proposes to go farther than has yet been suggested in any other of the towns. His proposal is to appoint a Committee to consider as to the acquiring of both the Gas Company and the Electric Lighting Company. The comprehensiveness of the scheme is likely to be the ruin of it. It is too large a cherry to make but one bite for the community. If they wish to acquire the undertakings of both Companies, they should take first one and then the other; and I know which I would commence with. In the matter of diplomacy, there would be a great difference between the adoption of the one or of the other first; but I am not going to advise the Corporation.

Notice of motion has been given in the Brechin Town Council, proposing that a man of experience be obtained to report to them on the value of the works of the Brechin Gas Company.

Instead of calling upon their new Manager (Mr. A. Wilson) to report upon the proposal to transfer the gas-works to a new site, the Perth Gas Commissioners have allowed him to report upon the condition of the works and the possibility of making them effective. Mr. Wilson is to be congratulated upon the wisdom he has shown in avoiding the temptation to do something heroic, and in settling down in an endeavour to make the most of existing surroundings. He finds, on consideration, that it will be possible to procure sufficient carbonizing power within the works for two years to come, by converting three settings of oil-retorts into coal-retorts, which will give them an increase of 19 per cent. of coal gas output, and leave sufficient oil-retorts for enrichment purposes. He has also found the scrubbing plant to be very ineffective, and to allow ammonia to pass, which both reduces the illuminating power of the gas and is a loss. He recommends that an additional pump of the Tangye or Cameron type be procured. The cost of these he estimates at not more than £200. He also considers that the storage capacity of their plant is insufficient; and he recommends that a new gasholder should be erected, similar to the one which they put up not a great many years ago, at a cost of about £10,000. The Works Committee, with one dissentient, recommended the Commission to proceed with the whole of the works. The Commission, however, sent the entire matter back to the Committee for reconsideration. It is evident, from the fact that it is proposed to expend so small a sum upon the present gas-works, and from the sending back of the subject to the Committee, that the Commission have still in view the necessity for a transfer of the works. Whatever may be the outcome, there can be no doubt that Mr. Wilson's proposal was a sensible one, because it would have given him time to look about for a suitable site, and to make himself familiar with the working of the undertaking generally. That it is imperative something should be done, is apparent from the fact that in January the output of gas exceeded that in the same month of last year by 2,223,200 cubic feet. It is observable that, while Mr. Wilson reported the illuminating power of the gas during January to have been of the average of 26·32 candles, the City Examiner reported it to have been of the average of 27·42 candles; so that Mr. Wilson is not overrating the product he supplies.

It was reported to the Denny Town Council on Tuesday that last month there was a consumption of gas amounting to over 14 million cubic feet, which was an increase of more than 100,000 feet over the corresponding month of last year. In consequence of the great increase which is being experienced month by month, the Gas Committee have begun to consider how the works should be extended. They visited the works, and found them in good order; but they wanted more manufacturing and storage capacity. Offers have been invited for new retorts; and on the subject of storage, it was remitted to the Committee to consider whether the Commissioners should erect a new gasholder, on another site, or whether they should build a larger holder on the site of an existing one. Provost Hunter said they had a most acute struggle to keep the place lighted. If the consumption of gas went on increasing, they would not be able, with their present plant, to meet it; and next winter their doom would be pronounced.

At Kilsyth, too, in the same neighbourhood, a similar difficulty is being experienced. It was reported to the Police Commission on Monday that there had been an increase of 84,900 cubic feet in January over the consumption in the same month of last year; and also that the yield per ton of coal was only 7770 cubic feet. Referring to the low yield, one of the Commissioners explained that they had not sufficient storage accommodation; and they were consequently unable to give sufficient time for the carbonization of the coal. With six-hour charges, they got about 9000 cubic feet of gas per ton; but they were obliged to draw their retorts at the end of three hours. The retorts also were not on the best system. Last Saturday night, both their gasholders were completely exhausted. Their consumption had gone up by leaps and bounds; and they were face to face with the question of providing increased storage accommodation. The subject was sent to the Gas Committee to consider and report upon.

The following announcement is made with reference to the Johnstone Gas Commissioners: "At a meeting of the Gas Commissioners on Monday, a report was read from the Gas Manager certifying that he had placed meters on two of the street-lamps, one of which was lighted by an ordinary burner and the other by an incandescent burner, with the result that he found the incandescent burner had consumed 450 feet of gas and the ordinary burner had only consumed 200 feet in the same time. The result of the test seemed to take the meeting by surprise." Everybody is surprised; and I observe that the Incandescent Gas-Light Company have taken prompt means to contradict the erroneous impression which might be created by the statement that it was their burner which was being used by the Johnstone Gas Manager. Of course, it may have been this Company's burner, used under defective conditions. To set the matter at rest, I would suggest to the Manager at Johnstone that he should change the burners; leaving the meters as they were in the test which he has just reported upon. Then, in case it should be the fittings that are wrong, he should change the meters, and again test both burners upon each. An exhaustive trial of this sort could do no harm to any interest.

In connection with the contracts for the work attached to the transfer of the Rothesay Corporation Gas-Works to a new site, it was reported to the Town Council this week that Messrs. Clayton, Son, and Co., Limited, of Leeds, to whom had been let the contract for the supply of ironwork and the construction of a new gasholder, had written asking to be relieved of their contract, as they had omitted an item in their estimate amounting to £300. The Corporation agreed to relieve them; and accepted the next offer, by the Whessoe Foundry Company, Limited, whose tender was £4917, or £78 more than the other.

Those Corporations who have adopted the three-wire system of distributing electricity known as the Hopkinson patent, are being pressed to pay a royalty on their works. Some of them have paid; but others—and notably Aberdeen, Edinburgh, and Belfast—have refused. A conference took place in London on Monday between representatives of a number of corporations, to consider if concerted action could be

taken to resist the claims which had been put forward. As the result, it was resolved that the cities named should proceed in the matter independently of the others.

There was a sort of palaver in the Glasgow Town Council on Monday over the report of the deputation to Edinburgh to view the electric lighting arrangements there. In speaking to the report, Mr. Primrose said that within the next two months Edinburgh, with little more than one-third of the population of Glasgow, would have 440 electric lights illuminating the streets; while Glasgow stood where it did a year or two ago, with 112. This was a record which was not creditable to Glasgow. With great difficulty, the Lighting Committee in Glasgow had got the cost of a 10-ampère lamp reduced to £26 per annum. In Edinburgh the lamps in Prince's Street ran at 15 ampères, and others in other parts of the city ran at 12½ and 10 ampères. The Street Lighting Committee paid the Electric Lighting Committee £20 per annum per lamp; and within a few months it was expected the charge would be reduced to £18 per lamp. He asked that the subject should be sent back to be further considered by the Watching and Lighting Committee, along with some members of the Gas and Electric Lighting Committee. Mr. R. M. Mitchell, the Convener of the Gas and Electric Lighting Committee, let in some light upon the subject. He said that beyond the statement as to the cost of the lamps, all that the Sub-Committee had done was based simply upon supposition and future results. The Sub-Committee had carefully concealed the fact that half the electric lamps in Edinburgh were extinguished at twelve o'clock—an arrangement which resulted in a saving of £2 per lamp as compared with Glasgow. In Edinburgh they had more modern works than in Glasgow; and they had not been trammelled, as Glasgow had been, by having to purchase old works. Who, if anybody, was to blame for the lamps being so inefficient? He understood that Mr. Primrose and the Lord Provost, who was Chairman at the time of the Electric Lighting Committee, stood together at the end of a thoroughfare in London and said that the lamps were the best ever seen in the world, and that it was the best system of electric lighting that could possibly be. Since then better lamps had been discovered. Mr. Arnot, the Engineer, had been in communication with other cities where electric lighting was used; and had learnt that in Blackburn the annual cost per lamp is £40, in St. Pancras £40, in Aberdeen £40, in Bristol £36 2s., in Brighton £30 2s. 11d., and in Portsmouth, where the lamps are put out at 10.30, £24. Even at present, Glasgow was therefore not so bad as was painted. Dr. Colquhoun said experience was now showing that they were not wisely led four years ago. He did not think that the members of the Watching and Lighting Committee or of the Gas Committee were in any way to blame. If there was any blame, it must be laid on the shoulders of the Town Council, who deliberately made up their mind that they would tie themselves neck and heel to the low-tension system. It was now admitted by everybody that this was a mistake; and the result of this initial blunder was that they were obliged to provide a generating station for street lighting by itself. The lighting in Edinburgh had been carried out on very different lines; and he believed that it would justify all that had been said regarding it by Mr. Primrose. What was wanted in Glasgow was that the blunder of committing themselves to the low-tension system should be at once swept aside—that they should recognize that in Glasgow, where there is a large area and a somewhat scattered demand, the only principle that could work profitably was that of getting a proper electric station on the high-tension principle, which could send the electric light out to the districts if necessary. The subject was re-committed, as desired. If nothing was done, the discussion furnishes a certain amount of interesting reading.

The Glasgow Corporation Gas Committee lately received a letter from Mr. R. F. Carpenter, the Chief Inspector under the Alkali, &c., Works Regulation Act, with reference to the registration under that Act of the chemical works in West Street, Tradeston, which were acquired by the Corporation some time ago from Messrs. J. Ross and Co., tar distillers, of Falkirk, who had for some years the contract for the tar and ammoniacal liquor made at the Tradeston Gas-Works. After giving due consideration to the letter, the Committee instructed the Secretary to make application, on behalf of the Corporation, for the necessary certificate of registration, and remitted the matter to Mr. R. M. Mitchell (Chairman), Mr. W. Stevenson, and the General Manager (Mr. W. Foulis), with power to have such alterations carried out at the works as may be required so as to obtain the certificate.

In connection with the proposed extension of the retort-houses and coal-stores at Tradeston, tenders were lately received for the various branches of the constructional work involved. After the three lowest tenders for each class of work had passed through the hands of the measurers to be checked and reported upon, they were remitted to the Chairman of the Committee on Gas-Works, and the General Manager, with power to accept the lowest offers if satisfactory. The contracts for the excavating and brickwork as well as the iron and slate works have already been placed.

Messrs. R. Laidlaw and Son, of Glasgow, have been successful in tendering for the supply of the pipes required for the extension of the gas-mains in the Clydebank and Shieldhall districts; and Mr. R. C. Brebner has the contract for laying the pipes.

In respect of the revenue derived from the sale of the residual products of the Glasgow Corporation Gas-Works, a somewhat notable decrease has been reported to the Finance Sub-Committee. Up to Dec. 31, 1895, and for the seven months commencing on the 1st of June, the revenue from this source was £66,485, as compared with £76,904 for the corresponding portion of the preceding year; so that there was a falling-off to the extent of £10,419. If the same proportional decrease should continue up to the end of the current financial year, it may be expected to amount to upwards of £17,000. Possibly the year's accounts, when they come to be presented, may show a sufficient set-off against this big decreaes of revenue in the shape of a smaller outlay for coals.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 330).

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	23½–24½	..	4 5 8
100,000	10	,,	7½	Do. 7 p. c.	16½–17½	..	4 5 8
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	107–109	..	4 11 9
200,000	10	16 Oct.	4	Belgrano (B. Ayres), Limited	7⅛–8⅛	+⅛	4 14 1
100,000	Stck.	30 Dec.	5	Do. 5 p. c. Deb. Stk	92–97	..	5 3 1
200,000	5	14 Nov.	6½	Bombay, Limited	7¼–7¾	+¼	4 3 10
40,000	5	,,	6½	Do. New, £4 paid	5–5½	..	4 14 7
380,000	Stck.	14 Aug.	12	Brentford Consolidated	275–280	..	4 5 8
210,000	,,	,,	9	Do. New	215–220	..	4 1 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	—	..	—
159,375	,,	16 Dec.	4	Do. 4 p. c. Deb. Stock.	127–132	..	3 0 7
220,000	Stck.	27 Sept.	11	Brighton & Hove Original	230–235	..	4 13 8
208,820	,,	,,	8	Do. A Ord. Stk.	185–190	..	4 4 3
933,500	Stck.	29 Aug.	5	Bristol, 5 p.c. max.	124–128	..	3 18 1
420,000	20	27 Sept.	11¼	British	54½–55½	..	4 1 1
50,000	10	29 Aug.	11½	Bromley, Ordinary 10 p. c.	22½–23½	..	4 17 10
71,000	10	,,	8½	Do. 7 p. c.	19–20	..	4 5 0
500,000	10	14 Nov.	4	Buenos Ayres (New) Limited	8¾–9¼	+½	4 4 8
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	101–103	..	5 16 7
150,000	20	11 July	8½	Cagliari, Limited	30–32	..	5 3 3
100,000	10	27 Sept.	6	Cape Town & District, Ltd.	12½–13½	..	4 8 10
50,000	50	2 Nov.	6	Do. 6 p. c. 1st Mort.	56–58	..	5 3 6
550,000	Stck.	16 Oct.	13½	Commercial Old Stock	327–332	+2	4 1 4
165,000	,,	,,	10½	Do. New do.	256–261	..	4 0 6
165,000	,,	16 Dec.	4½	Do. 4½ p. c. Deb. do.	147–152	..	2 19 2
800,000	Stck.	16 Dec.	13	Continental Union, Limited.	267–272	..	4 15 7
200,000	,,	,,	10	Do. 7 p. c. Pref.	210–215	..	4 13 0
51,620	Stck.	29 Aug.	14	Croydon Com'cial A 10 p. c.	280–285	..	4 18 3
157,500	,,	,,	11	Do. B 7 p. c.	222–227	..	4 16 11
535,000	Stck.	29 Aug.	5½	Crystal Palace Ord. 5 p.c. Stk	127–132	..	3 19 6
60,000	,,	,,	5	Do. 5 p. c. Pref.	—	..	—
486,090	10	30 Jan.	11	European, Limited	26–27	..	4 1 6
354,060	10	,,	11	Do. £7 10s. paid	17–18	..	4 14 3
5,746,590	Stck.	13 Feb.	12¼	Gaslight & Coke, A, Ordinary	298–303*	+1¼	4 4 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	105–110*	..	3 12 9
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	288–293*	+1	3 8 3
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	135–140*	+2½	3 11 5
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	200–205*	+3¼	3 13 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	195–200*	+1	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	285–290*	+1	3 9 0
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	163–172*	+1	3 9 8
1,061,150	,,	16 Dec.	4	Do. 4 p. c. Deb. Stk.	137–140	..	2 17 2
234,850	,,	,,	4½	Do. 4½ p. c. do.	148–153	..	2 18 9
908,000	,,	,,	6	Do. 6 p. c. do.	204–209	..	2 17 5
79,000	10	30 Oct.	6	Hongkong & China, Limited	13–14	..	4 5 8
3,800,000	Stck.	14 Nov.	12	Imperial Continental	247–252	..	4 15 3
376,400	100	1 Feb.	4	Do. 4 p. c. Debs. Red.	100–103	..	3 17 8
473,600	Stck.	13 Feb.	3½	Do. 3½ p. c. Deb. Stk ,,	107–109*	+1	3 4 2

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	16 Dec.	6	Malta & Mediterranean, Ltd.	6–6½	..	4 12 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	114–117	..	4 5 6
250,000	100	,,	4½	Do. 4½ p. c. Debs.	108–110	..	4 1 10
541,920	20	14 Nov.	5	Monte Video, Limited	16–17	..	5 17 8
150,000	5	28 Nov.	8	Oriental, Limited	8¼–8¾	+¼	4 11 5
135,000	5	,,	8	Do. New, £4 10s. paid	6¾–7¼	+¼	4 19 4
15,000	5	,,	8	Do. do. 1879, £1 paid	1¾–2	+¼	4 0 0
60,000	5	12 Sept.	7	Ottoman, Limited	5–5½	..	6 7 3
166,870	10	14 Feb.	2	Para, Limited	1¼–1¾	..	11. 8 6
420,000	100	2 Nov.	6	People's Gas } 1st Mtg. Bds.	105–110	..	5 9 1
500,000	100	9 Dec.	6	of Chicago } and Do.	100–105	..	5 14 3
250,000	10	16 Oct.	7	San Paulo, Limited	11–12	..	5 16 8
500,000	Stck.	13 Feb.	15½	South Metropolitan, A Stock	375–380*	+¾	4 1 7
1,350,000	,,	,,	12	Do. B do.	305–310*	+1	3 17 5
310,000	,,	,,	13	Do. C do.	321–326*	+½	3 19 9
800,000	,,	16 Jan.	5	Do. 5 p. c. Deb. Stk.	173–176	..	2 16 10
60,000	Stck.	12 Sept.	11½	Tottenham & Edmonton, A	250–255	..	4 10 2
60,000	,,	,,	8½	B	—	..	—
170,383	10	30 Dec.	10	Tuscan, Limited.	13–14	..	7 2 10
149,900	10	2 Jan.	5	Do. 5 p. c. Debs. Red.	100–102	..	4 18 0

WATER COMPANIES.

746,021	Stck.	30 Dec.	10½	Chelsea, Ordinary	305–310	+5	3 6 1
150,000	,,	,,	5	Do. 5 p. c. Pref.	168–173	..	2 17 9
160,000	,,	,,	4½	Do. 4½ p. c. Pref. Stk., 1875	—	..	—
175,785	,,	27 Sept.	4½	Do. 4½ p. c. Deb. Stock	155–160	..	2 16 3
1,719,514	Stck.	16 Oct.	7	East London, Ordinary	240–245	+9	2 17 2
654,740	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	155–160	..	2 16 3
100,000	,,	,,	3	Do. 3 p. c. Deb. Stk.	105–107	..	2 16 1
700,000	50	16 Dec.	6½	Grand Junction, 10 p.c. max.	122–126	+4	2 11 7
280,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	145–150	..	2 13 4
708,000	Stck.	13 Feb.	12	Kent	322–327*	+13	3 13 5
160,000	,,	,,	7	Do. New, 7 p. c. max.	202–207*	+2½	3 7 7
1,043,800	100	30 Dec.	7¼	Lambeth, 10 p. c. max.	253–258	+1	2 16 2
406,200	100	,,	7¼	Do. 7½ p. c. max.	210–215	+2	3 7 6
330,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	145–150	..	2 13 4
500,000	100	13 Feb.	12¾	New River, New Shares	400–410*	+11	3 2 2
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	141–146	..	2 14 10
902,300	Stck.	16 Dec.	6	S'thwk & V'xhall, Ordinary	155–160	+2	3 15 0
126,500	100	,,	6	Do. Do. 7½ p. c. Max.	143–148	+3	4 1 0
489,200	Stck.	,,	5	Do. Do. 5 p. c. Pref.	168–173	..	2 17 9
1,019,585	,,	—	4	Do. 4 p. c. A Deb. Stk.	145–150	..	2 13 4
1,155,066	Stck.	16 Dec.	10	West Middlesex	303–308	+3	3 4 11
200,000	,,	,,	4½	Do. 4½ p. c. Deb. Stk.	155–160	..	2 16 3

*Ex div.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 15.

Sulphate of Ammonia.—There has been a steady demand, at rather hardening prices. Consumers' orders have been more in evidence; and, as covering is still going on, makers have assumed a firmer attitude. Buyers, however, show great unwillingness to follow the advance further; and there is, in consequence, at the close, less actual business doing than there was earlier in the week. The quotations are £8 10s. to £8 11s. 3d. per ton, f.o.b. at ports. There has been a good inquiry in the forward position; and there would be large buyers at about prompt prices, but, in face of the firmer spot market, speculators are now asking a substantial premium for forward delivery. Makers for the most decline to quote ahead, unless at practically prohibitive prices.

Nitrate of Soda.—The market for nitrate of soda is firm in all positions; but there is less activity in the market than there was a week or two ago. Spot value is 7s. 10½d. to 8s. per cwt., according to quality. Due cargoes of ordinary quality are worth about 7s. 10½d. per cwt.; and for shipment, 8s. to 8s. 3d. per cwt., according to position, are the quotations.

LONDON, *Feb.* 15.

Tar Products.—Ninety per cent. benzol is again in better demand; and buyers are offering more money for it. For 50's, there is no inquiry; and toluol is difficult to dispose of. Solvent naphtha is in steady request; and considerable business is being transacted in it. Pitch is fairly firm; and as stocks of it are said to be low, producers are expecting an improvement in price, though buyers are resisting this movement. Creosote is dull; Carbolic acid is dearer, with pressing inquiries. The great reduction in stocks of anthracene in this country has had an important influence on the position and value of this article, which is firmly held at the rates quoted below.

The following values have been realized during the week—in all cases, excepting tar and anthracene, less 2½ per cent.: Tar, 18s. to 23s. 6d. Pitch, 34s., west coast; 36s., east coast. Benzol, 90's, prompt and early delivery, 2s. 2d.; for forward delivery, 2s.; 50's, nominal, 1s. 8d. Toluol, 1s. 6d. Solvent naphtha, 1s. 3d. to 1s. 4½d. Crude, 30 per cent., naphtha, 9½d. Creosote, 1½d. Naphthalene, pressed, 43s.; drained, 27s. 6d. Cresylic acid, 1s. 1½d.; crude, 10½d. Carbolic acid, 60's, 2s.; 75's, 2s. 3½d. Anthracene, "A" quality, 11½d. to 1s.; "B," 9½d. to 10d.

Sulphate of Ammonia is firmer; and buyers are numerous. Makers have advanced prices; and it is stated that for spot delivery, as much as £8 13s. 9d. has been realized. For early delivery, the price is £8 12s. 6d., less 3½ per cent. at all ports; while gas liquor is offered at 6s. to 7s. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The continued exceptional mildness of the season is, as might only be expected, making itself severely felt upon the coal trade of this district; and business has not been so quiet for a very considerable time past. Outside the immediate district of Manchester, there are very few collieries working more than four days per week—some of them not more than three; and supplies of all descriptions of round coal are in excess of requirements. This is necessarily bringing about a weakening tendency in the market; and although there are no actually quoted reductions upon late rates, representatives of collieries, in many cases, are easier, and offer slight concessions to meet competition from other quarters, or to effect sales of anything like quantities. Best Wigan Arley does not fetch more than 9s. 6d. to 10s. per ton at the pit; Pemberton four-feet and seconds Arley, 8s. up to 9s.; and common house coals, 7s. per ton. Notwithstanding the increased activity in the iron, engineering, and other coal-using branches of industry, common round coals, for steam and forge purposes, show no improvement whatever. If anything, the position with regard to these gets even worse. At the pit mouth, it is only exceptional qualities that are fetching more than 6s. per ton for inland sales; while for shipping orders, 5s. 3d. to 5s. 6d. is taken freely. The position as regards engine fuel varies considerably; some collieries readily disposing of their output of slack, and others having to stock. Prices are consequently irregular, ranging from 2s. 9d. to 3s. 6d. per ton for common sorts, and from 4s. 3d. and 4s. 6d. to 5s. for better qualities. Only a slow business comes forward in the shipping trade, with prices as low as ever—7s. to 7s. 6d. per ton for ordinary steam coal, and 8s. for some of the better qualities, representing the average selling prices, for delivery Mersey ports.

Northern Coal Trade.—The chief feature in the coal trade in the last few days has been the allotting of the contracts for the supply of the coal for the Swedish railways. This coal is delivered at eight Swedish ports; and as the price includes the cost of the freight thereto, comparison is rather difficult. But in regard to Stockholm, it may be said that the price at that port is, for Durham steam coals, about 12s. per ton, or practically 6d. per ton below the rate that was paid under the contracts given out a year ago. These contracts are expected to modify the prices that are being asked for best steam coals over the season; but for Nothumbrian steam coals, the price quoted for season's deliveries is still 8s. 6d. per ton f.o.b. Steam smalls are fairly steady at 3s. 6d. to 3s. 9d. per ton; but this is partly due to the limited production. In regard to gas coals, the demand is now beginning to decrease for home use; but it is probable that the shipments will be early this year, which will keep the pits fairly well occupied. One of the earliest of the contracts for gas coal is that for Stockholm, which is expected to be decided shortly. There is no alteration in the price here for occasional cargoes—it being from 6s. 3d. to 6s. 9d. per ton f.o.b.; but it is anticipated that the contracts

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No. 403 and 404.

No.	External Dimensions.			Oven.			Hot Plate.	No. of Boiling-Burners	Price.	White Enamelled Crown extra.
	High.	Wide.	Deep.	High.	Wide.	Deep.				
401	18½	13½	11½	14	11	9½	13½ by 11½	1	28/6	—
402	24½	15½	15	18	11	11	15½ ,, 15	2	40/-	2/6
403	30	18	17	19	11	11	18 ,, 17	2	45/-	2/6
404	30	18	17	19	13½	11	18 ,, 17	2	50/-	2/6
404	If fitted with Enamelled-Lined and Jacketted Door and Fire-Brick Crown, as adopted by The London Gaslight and Coke Co.								55/-	2/6

Any of these Cookers, except No. 401, can be fitted with Griller at an extra charge of 2/6; but the adoption of the Griller is not recommended for use with Prepayment Meters.

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will be rather less than they were a year ago, because they were then influenced by the Coal Sales Association. It is worth notice that the low price of coals is inducing some of the coalowners to make applications for certain concessions to be made to them in the cost of bringing steamers to some of the loading places. In the coke trade, there is an increase in the demand and greater general activity. There is little enlargement as yet of the export needs; but more is being used in the local iron manufacture, and more is also being sent to north-western furnaces. The prices vary a little; but they are on the basis of 14s. 3d. to 14s. 9d. per ton f.o.b., for best Durham coke. Gas coke continues to be shipped in large quantities; and as the production is now a little less than a month ago, the stocks that had accumulated in some quarters are being reduced by the shipments and the fair quantities that are being taken regularly by the cement and other manufacturers.

Scotch Coal Trade.—There appears to be a sort of cross purpose in the coal trade in Scotland at present. On the one hand, it is common knowledge that in not a few instances reductions of from 4d. to 6d. per day in the miners' wages have been effected, without objection on the part of the men, and that there is great distress prevailing on account of broken time at the pits; while, on the other, the masters are jubilant over the knowledge that the greater part of the Swedish railway coal contract, which was lost in consequence of the strike of 1884, has been again secured by Scotch coalowners. The outlook is thus in one way mixed; but in another sense it is clearer, because, if the coalowners can get their men to work for less per day, there will be a better output. Meantime there is little forward trade doing, and the market continues dull; the supplies of all sorts being greatly over the demand. The prices quoted are: Main, 5s. 9d. per ton f.o.b. Glasgow; ell, 6s. 9d.; splint, 6s. 3d. to 6s. 6d.; and steam, 7s. 6d. The shipments for the past week amounted to 116,245 tons—a decrease of 11,875 tons as compared with the previous week; but an increase of 8556 tons over the corresponding week of last year. For the year to date, the total shipments have amounted to 651,754 tons—an increase of 77,399 tons on the quantity in the corresponding period of last year.

Reduction in Price at Hoylake.—The Directors of the Hoylake and West Kirby Gas and Water Company, Limited, have decided to reduce the price of gas supplied for lighting purposes from 4s. to 3s. 9d. per 1000 cubic feet; while for that used for cooking, heating, or driving gas-engines (provided a separate meter is fixed) the price will be reduced from 3s. 9d. to 3s. 6d.—both reductions to take effect as from the 31st of March next.

Barnet District Gas and Water Company.—The result of the working of this Company in the six months ending Dec. 31, 1895, was a balance of £15,036 on the net revenue account. Out of this the Directors recommend the declaration, at the ordinary general meeting next Friday, of a dividend, less income tax, at the rate of 9 per cent. per annum on the "A" and "C" stocks, 8 per cent. per annum on the "B" stock, and £6 6s. per cent. per annum on the "D" (gas and water) capital. The Directors report continued progress in the Company's business.

Gas and Water Works Extensions at Malvern.—At the meeting of the Malvern Urban District Council last Tuesday, the Council approved of plans prepared by the Engineer and Manager (Mr. H. P. Maybury) for the erection of a gasholder to contain 500,000 cubic feet, and also of plans for the construction of a reservoir capable of holding 140,000 gallons of water, together with two 15-horse power gas-engines and pumps, and the necessary mains for supplying a recently added part of the district. The extension at the gas-works is also rendered necessary by the increase of the district. At the same meeting, it was resolved that the Clerk should be instructed to make immediate application to the Local Government Board for power to borrow £9500, the estimated cost of the extensions.

The Public Lighting Contract at Dover.—At the meeting of the Dover Town Council last Tuesday, the public lighting contract for three years was concluded with the Dover Gas Company. In the course of the proceedings, it was stated by the Deputy Town Clerk that the cost of the gas-lamps discontinued was £426, as compared with £950 for the electric lamps which had replaced them; being a difference of £524.

What is a Proper Use of a Town Hall?—A rather curious question came up at the meeting of the Arundel Town Council last Tuesday. The Arundel Gas Company had expressed their desire to obtain the use of the Town Hall for an exhibition of gas appliances, &c.; and this fact was mentioned at the meeting by Mr. Bartlett. Thereupon the Mayor (Alderman Roberts) said he had declined the use of the hall to a "Cheap Jack;" and he objected to the letting of it to the Gas Company for the purposes of an "advertising shop." If he let to one, he would perhaps have to let to another. Mr. Rolls spoke in indignant terms of the Mayor comparing the Gas Company with a "Cheap Jack." He thought there was no more harm in letting the hall for the purpose of a gas exhibition than there was in letting it as an academical dancing saloon. We should say that the first-named purpose would be far more useful than the last.

Lecture on Coal Gas.—Last Tuesday, Mr. T. Ebenezer Pye gave a lecture on the advantages of coal gas at the Stormont Hall, Battersea. Commencing with a brief *résumé* of the processes of gas manufacture, the lecturer graphically illustrated his remarks by the aid of large diagrams, and a complete model gas-works in actual operation, which was much appreciated by the audience. Mr. Pye then described the different systems of gas lighting now in general use; pointing out their relative efficiencies, and their adaptability for the varying requirements of domestic and trade illumination. A few hints were given on the best method of dealing with the incandescent light; and the lecture was brought to a close with a recapitulation of the superior advantages of coal gas in point of economy, efficiency, convenience, and safety. An interesting stall fitted up by the South Metropolitan Gas Company, and numerous exhibits of gas-utilizing appliances by various firms, together with a series of cookery demonstrations by Mrs. Pye, and the sale of quantities of gas-cooked pastry and poultry, added greatly to the interest of the proceedings. A hearty vote of thanks brought a pleasant and a profitable evening to a close.

The St. Ives Corporation Gas-Works.—The Corporation of St. Ives (Cornwall) have been put into an enviable position in reference to the development of the gas undertaking, which they acquired last year, by the generosity of Mr. T. B. Bolitho, M.P. In order to practically rebuild the works, the Corporation obtained the sanction of the Local Government Board to the borrowing of £6500; but they found themselves in difficulties when the Public Works Loan Commissioners offered the money at 4 per cent., with the stipulation that it must be repaid in twenty years. There is doubt in the minds of the Corporation as to whether the works can be made to pay from the first, and a natural reluctance to make them a charge upon the rates. Under these circumstances, the Mayor (Mr. E. Hain, jun.) went to see the member for the division, who is connected with a banking firm, and who consented to lend the money for thirty years at 3¼ per cent. Alderman J. Daniel, the Chairman of the Gas Committee, in reporting the result of the negotiations yesterday week, said Mr. Bolitho further told them that if they were short of money for the first few years, while they were making the gas-works pay, possibly he would not enforce the payment of the principal so long as they paid the interest. The Mayor added that this rendered it quite certain that the gas-works would not make any demand upon the pockets of the ratepayers; and he looked forward to the time when they would prove a very valuable property to the Corporation. It was decided to accept Mr. Bolitho's generous offer.

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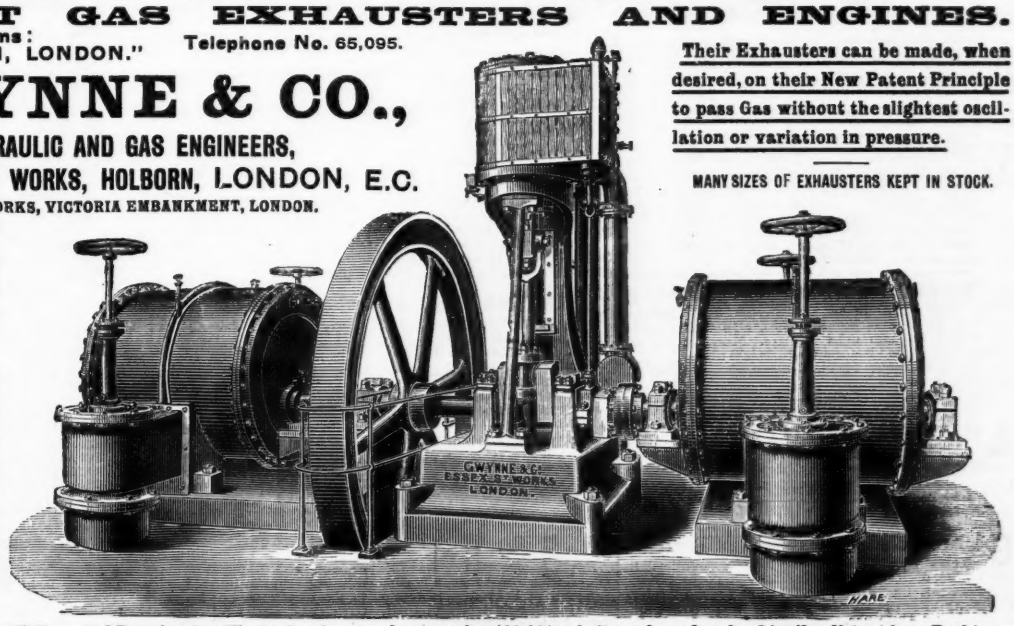

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WANTED, a re-engagement as Working MANAGER or MANAGER of Small Works. Thoroughly experienced in Carbonizing, Engines and Exhauster, Main and Service Laying, Fitting up Houses on the Automatic System, and all the General Routine of a Gas-Works. Good Testimonials.
Address W. OWEN, Manager, Horley District Gas Company, Horley, SURREY.

WANTED, a Situation as Working MANAGER in a Small Gas-Works. Nineteen years' experience in Small Works, also with Engine and Boilers, and in light Repairs. Married; age 40. Eleven Years' good References from last place.
J. E., 1, Wardour Place, Church Street, Chalvey, Slough, BUCKS.

EMPLOYMENT WANTED.

A MANUFACTURING Chemist desires to PLACE HIS SON (age 19) UNDER A MANAGER in a Gas-Works, to obtain a thorough practical knowledge of the Industry.
Address W. A. M., Grenville, Upper Clapton, LONDON, N.E.

GAS-FITTER, age 28, with Fourteen Years' Experience (having been apprenticed to the Trade), desires a SITUATION. Can fit-up Houses, lay Services, fix Stoves, and fix and read Meters (Ordinary and Prepayment). Good References, unmarried, and Abstainer.
Address GEORGE E. MACKLEY, 77, Baker's Road, St. Augustine's, NORWICH.

W. C. HOLMES & CO., Huddersfield; AND 20, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also Improved Patent Rotary Scrubber-Washers.
*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.
RELIANCE LUBRICATING OIL COMPANY, WATER LANE, GREAT TOWER, LONDON, E.C.
Depôts at Liverpool, Bristol, Hull, Glasgow, and Newcastle-on-Tyne. Telegrams: "Subastral, London."

GAS EXHIBITIONS.

WANTED, an Experienced Attendant for the coming Season.
State Terms to FLETCHER, RUSSELL, AND CO., LIMITED, WARRINGTON.

WANTED, an Assistant Draughtsman, also an IMPROVER for Gas Engineering Works in North of England.
Apply (by letter) stating Age, Experience, and Salary required, to No. 2635, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MANAGER and Foreign Correspondent wanted with a thorough knowledge of the Gas-Meter Trade throughout Europe. Must be a good Linguist, and have exceptional References.
Apply, by letter, stating Age and Salary required (which will be treated in confidence), to No. 2633, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING Manager required for small Gas-Works 40 Miles from London, competent to undertake small Repairs. Wages, 25s. a week, with House, Gas, Coke, and Coal free.
Applications, stating full Particulars as to Age, whether married or single, and as to Qualifications, to be addressed at once to GEO. WOOD, Solicitor, SOUTHEND-ON-SEA.

CARNARVON CORPORATION GAS-WORKS.

WANTED, a thoroughly Practical Man to undertake the MANAGEMENT of the above Works, which include Sulphate Making and Meter Testing.
Annual make, 21 Million Cubic Feet. Salary, £120. List of Duties may be had on application to the undersigned.
Applications, stating Age, Experience, and References, with three recent Testimonials, to be sent in by the 29th of February, addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, and endorsed "Gas Manager."
D. H. JONES,
Borough Accountant.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

THE Undersigned is in a position to supply, at the very lowest Prices, the most suitable kind of BENZOL for enriching Gas, made from Hardman's Patent Carbonization Process, of which I am the Sole Patentee. On application, I would furnish Price on the most reasonable terms; giving advice how to utilize it on the most economical method.
J. HARDMAN, Manufacturing Chemist.
Milton, Staffs.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to
No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

WANTED, Two good Gas-Fitters for Prepayment Meter Work.
Apply to the NUNEATON GAS COMPANY.

WANTED, Offers for 90 and 50 per cent. BENZOLS and NAPHTHAS. Particulars and Samples on Application.
Apply, by letter, to No. 2630, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Four Purifiers, 6 feet Square by 3 feet deep, with Dry-Faced Centre-Valve and Connections, Lifting Apparatus, and Wrought-Iron Girders for same to travel on, complete. Also a 5-inch Dry-Faced FOUR-WAY VALVE.
Apply to GEORGE MOAT, Manager, Gas-Works, Purston, near PONTEFRACT.

FOR SALE—Four Purifiers, 8 feet square 3 feet deep, with 8-inch Dry-Faced Centre-Valve and Connections; Wood Grids nearly new. 4000 feet per hour STATION METER, with Connections; New Drum four years since. Two small SCRUBBERS, Wrought Iron, with Six-Way Valve 100,000 feet LIVESEY WASHER, with 8-inch Valves and Connections. A FISON EXHAUSTER REGULATOR. Six-inch Self-Acting BYE-PASS VALVE. Two 8-inch Four-Way Dry-Faced BYE-PASS VALVES. Complete Set of IRONWORK for four Beds of six 15-inch Circular Retorts, including Mouthpieces, Ascension and Bridge Pipes, Separate Hydraulic Mains, fitted with Valves, &c.
Apply to HARRY WIMHURST, Gas-Works, SLEAFORD.

FOR SALE.

ONE Single-Lift Gasholder, 50 feet diameter, 20 feet deep, with Cast-Iron Tank, six Guide Columns, and Wrought-Iron Top Bracing.
One Single-Lift GASHOLDER, 16 feet diameter, 10 feet deep, with Cast-Iron Tank.
Two Vertical Multitubular Gas-Heated STEAM-BOILERS, 8 feet diameter by 18 feet high, with 25 3-inch Steel Tubes, suitable for a Working Pressure of 80 lbs., complete with Steam and Water Fittings.
One GAS-WASHER, 4 ft. by 4 ft. by 12 ft. high, and one SCRUBBER for Coke, 4 feet diameter by 12 feet high.
One Samuelson and Co.'s "O" size "ACME" EXHAUSTER and 14 in. by 14 in. DUPLEX ENGINE combined, having a capacity of about 10,000 cubic feet per minute.
This Plant has only worked a short time, and is almost new, having been erected within the last Six Years.
The above can be seen in Sheffield by appointment.
Applications or other correspondence addressed to No. 2636, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., will receive prompt attention.

PREPAYMENT METER.

BRITISH AND COLONIAL PATENT RIGHTS FOR SALE.

THE Inventor is a practical Meter Maker. The Mechanism is simple, strong, compact, and cannot be tampered with.

Full Particulars on application (by letter) to No. 2634, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MIRFIELD GAS COMPANY.

FOR SALE.

OFFERS wanted for pulling down and removing a TELESCOPIC (disused) GAS-HOLDER, 70 ft. diameter by 24 ft. deep, including eight Cast-Iron Columns and One Tier of Girders. Weight of Gasholder, about 40 Tons.

Particulars may be obtained at the Gas-Works, Ravensthorpe.

Tenders, stating lump sum, to be sent in not later than Monday, March 2, 1896, to

SAML. DAY,
Secretary.

Gas Company's Office, Ravensthorpe,
Feb. 14, 1896.

WIDNES CORPORATION GAS AND WATER WORKS.

GAS PLANT, &c., FOR SALE.

THE Gas and Water Committee have the following PLANT for disposal: ANNULAR CONDENSER, 12-inch STATION GOVERNOR, ENGINE and EXHAUSTER (capacity, 22,000 Cubic Feet per hour), MANN and WALKER TOWER SCRUBBER 38 ft. by 8 ft., and a WALKER PURIFYING-MACHINE of 1 Million Cubic Feet capacity per diem.

Further Particulars may be obtained on application to Mr. ISAAC CARR Assoc.M.Inst.C.E., Gas-Works, WIDNES.

GAS PLANT, BUILDINGS,
AND
FREEHOLD LAND AT CARSHALTON, SURREY,
FOR IMMEDIATE SALE.

THE Croydon Commercial Gas and Coke Company, having discontinued the Manufacture of Gas at their Works in Wrythe Lane, Carshalton, Surrey, have the following GAS PLANT, APPARATUS, BUILDINGS, and FREEHOLD LAND FOR SALE, viz.—

Retort-House and Coal-Store complete, with Wrought-Iron Roofs, six Beds of six Round Fire-Clay Retorts in each, 18 inches diameter by 9 ft. 3 in. long, and three Beds of similar new Retorts and Arches, and three Arches, complete, ready for Retorts.
Hydraulic Mains, Fittings, &c.
Battery Condenser, with 12-inch Valves, Connections, and Bye-Passes.
Horizontal Steam-Engine, Exhauster, and Exhauster Governor, complete.
Washer (Good's Patent), 8 feet diameter, with 12-inch Connections and Valves complete.
Washer, 12-inch, with 6-inch Connections and Valves complete.
Four Purifiers, 12 feet square, with Sieves and 12-inch Connections, Lifting Apparatus and Railway for same, complete.
Station Meter, 10,000 cubic feet per hour, with 12-inch Connections.
Gasholder (Single-Lift), 80 feet by 24 feet, with Brick Tank, Columns, Inlet and Outlet Valves complete, prepared for Telescoping.
Gasholder (Single-Lift), 60 feet by 16 feet, Standards, Brick Tank, &c.
Gasholder, 35 feet by 12 feet, Standards, Brick Tank, &c.
Governor, 6 inches diameter, with 6-inch Valves and Bye-Pass complete.
Governor, 12 inches diameter, with 12-inch Valves and Bye-Pass complete.
Evans Photometer, Clock, Gauges, &c., complete.
Three Large Cast-Iron Water-Tanks (above ground).
Liquor-Tank.
House and Offices, Engine and Boiler House, Meter-House, Lobby and Store-Room, Governor-House and Testing-Room, Purifying House and Shed, Smith's Shop.
Freehold Land, 3 acres, 0 roods, 37 perches (about 2 acres not built upon).

Orders to view the Plant and Works, and Particulars of Prices the Company require for the whole or any portion of the above, can be obtained on application to

W. J. RUSSELL,
Secretary.

Offices: Katharine Street, Croydon,
Jan. 18, 1896.

RECOVERED SULPHUR FOR SALE.

THE South Metropolitan Gas Company invite TENDERS for the purchase of about 60 Tons of RECOVERED SULPHUR, to be delivered in bulk into Buyer's Barge in the Surrey Canal.

Samples and further Information may be obtained on application at the Chief Engineer's Office, 709A, Old Kent Road, S.E.

FRANK BUSH,
Secretary.

February, 1896.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee are pre- pared to receive TENDERS for supplying and fixing One TELESCOPIC GASHOLDER, 100 feet diameter, required at their Hollinwood Gas-Works.

Specification may be obtained and Plans seen on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham.

Tenders to be sent in on or before the 4th of March, 1896.

A. NICHOLSON,
Town Clerk.

THE Directors of the Hawkhurst Gas Company invite TENDERS for the supply of about 500 yards of CAST-IRON MAIN PIPES, 6 inches diameter, Socket and Spigot. Minimum Weight, 2½ cwt. per 9 feet length, and to withstand a Pressure of 75 lbs. per square inch. Price quoted should include free delivery to Hawkhurst Station, S.E.R.

Tenders should be sent to me on or before March 2, 1896.

GEORGE MORRIS,
Secretary.

Gas-Works, Hawkhurst, Kent,
Feb. 15, 1896.

TENDERS FOR GAS COAL, ETC.

THE Directors of the Preston Gas Com- pany are prepared to receive TENDERS for the supply of CANNEL and screened and unscreened GAS COAL for One, Three, or Five Years, from the 30th of June next.

Particulars may be obtained from the undersigned.

Tenders, stating class of Coal, District and Pit where raised, and Price, addressed to the Chairman of the Company, and endorsed "Tender for Coal, &c.," must be delivered on or before Wednesday, the 4th of March, 1896.

HENRY GREEN,
Secretary.

BOROUGH OF BRIGHOUSE.

THE Mayor, Aldermen, and Burgesses of the Borough of Brighouse, acting by the Council, are prepared to receive TENDERS for the supply of the following Stores, viz.—FIRE-CLAY GOODS, IRONMONGERY, BRASS MAIN COCKS, NEW WET GAS-METERS, NEW DRY GAS-METERS, OIL, PAINTS, &c., STEEL GOODS, WROUGHT-IRON TUBES AND FITTINGS, WROUGHT-IRON GOODS, AND BRUSHES, required by the Gas Committee during the Year ending March 25, 1897.

Specification and Form of Tender can be obtained on application at the Gas Engineer's Office, Mill Lane Works, Brighouse.

Sealed tenders are to be sent in on or before Friday, Feb. 28, 1896, addressed to the Town Clerk, Public Offices, Brighouse.

The lowest or any tender not necessarily accepted.

By order,
JAMES PARKINSON,
Town Clerk.

Public Offices, Brighouse,
Feb. 11, 1896.

RENFREW CORPORATION GAS-WORKS.

TENDERS wanted for the following:—

(1) GASHOLDER and CAST-IRON TANK, 65 ft. by 36 ft. (Two Lifts of 18 feet each).
(2) GASHOLDER and CAST-IRON TANK, 50 ft. by 32 ft. (Two Lifts of 16 feet each).
(3) GASHOLDER only, 44 ft. by 32 ft. (Two Lifts of 16 feet each).
(4) 12-inch GOVERNOR and CONNECTIONS.
(5) 780 Yards of 12-inch MAIN and SPECIALS.

Drawings may be seen at the Gas-Works, and Specifications obtained from the Manager. A Deposit of 10s. 6d. to be lodged in respect of each Specification, which will be repaid on receipt of *bonâ-fide* Offer.

Tenders, marked "Gas-Works Offer," to be lodged with Subscriber by Monday, the 2nd of March.

The Commissioners do not bind themselves to accept the lowest or any Offer.

J. M'LAREN,
Town Chamberlain.

Chamberlain's Office, Renfrew,
Feb. 13, 1896.

SELBY URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Selby Urban District Council are prepared to receive, on or before noon on Monday, the 24th day of February, 1896, OFFERS for about 3000 Tons of high-class COAL suitable for Gas Making, for delivery in suitable Waggons at the Gas-Works Siding, Selby, in such quantities as may be required for a period of One Year, commencing about the 1st day of June next.

Particulars and Printed Forms of Tender may be had on application (*in writing only*) from the undersigned, to whom tenders, duly endorsed "Tender for Coal," must also be addressed.

By order of the Council,
MATT. DUNN, A.M.Inst.M.E.,
Engineer and Manager.

Gas-Works, Selby,
Feb. 5, 1896.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Thursday, the 27th day of February inst., at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditors, to declare Dividends, and for General Purposes.

Notice is also given, that at such Meeting a RESOLUTION will be submitted for the creation of a further amount of DEBENTURE STOCK, and to authorize the issue thereof.

The TRANSFER BOOKS WILL BE CLOSED from the 13th to the 27th of February, 1896, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices at the Works: Bromley, Kent,
Feb. 12, 1896.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 29th day of February inst., at Half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors, the Statement of Accounts for the Half Year ended the 31st of December, 1895, to declare a Dividend and to transact such other Business as the Act of Parliament directs.

The TRANSFER BOOKS WILL BE CLOSED from Saturday, the 15th inst., until Monday, the 2nd of March next.

By order of the Board of Directors,
JAMES RANDALL,
Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
Feb. 14, 1896.

Gas Stocks and Shares in the—
West Ham Gas Company.
Croydon Commercial Gas and Coke Company.
Hornsey Gas Company.
Enfield Gas Company.
Southend Gas Company.
Wandsworth and Putney Gaslight and Coke Company.
Hampton Court Gas Company.
Herne Bay Gas and Coke Company.
Barking Gas Company.
Goring and Streatley Gas and Water Company.
Chelmsford Gas and Coke Company.
Sunbury Gas Consumers' Company.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Monday, March 2, at Two o'clock.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

Second Portion of the Estate of the late William Halfhead, Esq.—Important Sale of Gas and Water Stocks and Shares in the following Undertakings—
Gaslight and Coke Company—£450 Stock ("A" and "K").
Commercial Gas Company—£520 Stock (Old and New, and Debenture).
Hornsey Gas Company—£1220 Stock ("C," "B," and Preference).
West Ham Gas Company—237 Shares and £700 Debenture Stock.
Tottenham and Edmonton Gas Company—£460 Stock ("A" and "B").
Lea Bridge Gas Company—15 Shares (Original).
Romford Gas Company—47 Shares (Original and "B").
West Kent Gas Company—44 Shares (Original and New).
Worthing Gas Company—£200 Stock and 10 New Shares.
Enfield Gas Company—£731 Stock (Preference and Debenture).
North Camp and Farnborough Gas Company—20 Shares.
Bournemouth Gas and Water Company—40 "B" Shares, £300 Debenture Bonds.
Barnet District Gas and Water Company—£150 Stock and 20 "D" Shares.
West Surrey Water Company—152 Ordinary and Preference Shares and £450 Debenture Stock.

All paying good Dividends and offering Investments of the highest character.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Wednesday, March 18, at Two o'clock precisely, in lots.

Particulars of Messrs. LEWIS and SONS, Solicitors, 7, WILMINGTON SQUARE, W.C., and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C., and TOTTENHAM.

BRISTOL WATER-WORKS COMPANY.

SALE OF STOCK.

ALEXANDER, DANIEL, SELFE, & CO. will SELL BY AUCTION, at the Bank Auction Mart, Corn Street, Bristol, on Thursday, the 5th day of March, at Two o'clock in the Afternoon,

£15,000

BRISTOL WATER-WORKS SEVEN PER CENT. MAXIMUM CONSOLIDATED ORDINARY STOCK, In convenient Lots of £100 Stock and upwards.

The Dividend on this Stock is subject to a Proportionate Diminution whenever the Maximum Dividend to which each Class of Ordinary Shares or Stock of the Company is entitled shall not be paid up in full; but such diminution may be made up in subsequent years.

For further Particulars and Conditions of Sale, apply to the AUCTIONEERS, Bank Chambers, Corn Street, BRISTOL (and 34, Old Jewry, London, E.C.); to Messrs. FUSSELL AND CO., Solicitors, 36, Corn Street, BRISTOL; or to the BRISTOL WATER-WORKS COMPANY, Small Street, BRISTOL.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

NOTICE.

Whereas it has come to the knowledge of the INCANDESCENT GAS-LIGHT COMPANY, Limited, of Palmer Street, Westminster, that a Company called the Meteor Incandescent Gas-Light Company, Limited, a firm known as Putz and Co., and a Company known as the Evening Sunlight Incandescent Light Company or the New Incandescent Light Company, are selling, and are offering for sale, forms of Incandescent Gas-Lights called respectively the "Meteor," the "Champion," and the "Evening Sunlight,"

THIS IS TO GIVE NOTICE, THAT THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, will commence ACTIONS FOR INFRINGEMENTS OF THEIR PATENTS against all persons found dealing in any manner with the said "Meteor," "Champion," or "Evening Sunlight" Incandescent Gas-Lights, which are all constructed in Infringement of the Patent of the Incandescent Gas-Light Company, Limited.

The validity of the Company's Patent has been certified by the Hon. Mr. Justice Romer.

FAITHFULL & OWEN,
11, Victoria Street, S.W.
Solicitors for the Incandescent Gas-Light Company, Limited.

NOTICE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

> "The Incandescent Gas-Light Company, Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo*, Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—

> The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others*, the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.

(Signed) FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

WARNING.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

WHEREAS, it has been brought to the notice of the INCANDESCENT GAS-LIGHT COMPANY, LIMITED, THAT DIVERS FIRMS UPON THE CONTINENT OF EUROPE are Manufacturing Incandescent Gas-Mantles, and are sending the same into this Country, and are advertising for Agents to push the sale of these Mantles,

THIS IS TO GIVE NOTICE, THAT ALL SUCH MANTLES ARE INFRINGEMENTS OF THE COMPANY'S PATENT, and that the Company will take proceedings for Infringement against all persons purchasing or using any of such Incandescent Gas-Mantles. THE COMPANY OWN THE MASTER PATENTS in this Country for the manufacture of Incandescent Gas-Mantles, and the validity of such Patents has already been certified by the Honourable Mr. Justice Romer, and the Company will enforce their Patent Rights against all Infringers.

FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.
11, Victoria Street, Westminster.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an Action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.
Nov. 30, 1895.

THE DRUM
FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.
See Advertisement in last and next issue.

REPORTS OF GAS ASSOCIATIONS
— UNITED KINGDOM —
THIRTEENTH YEAR.
Now Ready, Price 5s. 6d. each, Post Free,
THE COMPLETE REPORTS
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FOR 1895.
The Twelve previous Volumes (for 1883 to 1894) are still on Sale. Price 5s. 6d. each, post free.
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Gas Companies are solicited to try Samples of the
MIRFIELD
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This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.
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Established 1872.

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ESTABLISHED OVER 50 YEARS.
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All Estimates given free for Lead Chemical Burning, and also Contracts for Sulphate Saturators.
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Please write for Estimate before ordering elsewhere.

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HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

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Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

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Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
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Tar . . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

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SHOWS AT A GLANCE THE HEATING VALUE OF GAS.

NO BOMB. NO ANALYSIS.

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LOW MOOR BLACK BED GAS COAL.

YIELD OF GAS PER TON - 10,375 CUBIC FEET.
ILLUMINATING POWER - 17·50 SPERM CANDLES.
COKE - - - - - - - - 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

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Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

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SILICA BLOCKS, BRICKS, AND CEMENT

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FOR GAS-FURNACES.

Trade Mark: "SILICA."

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GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

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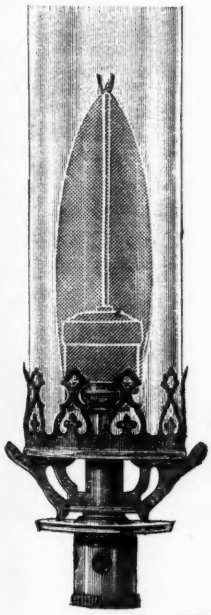
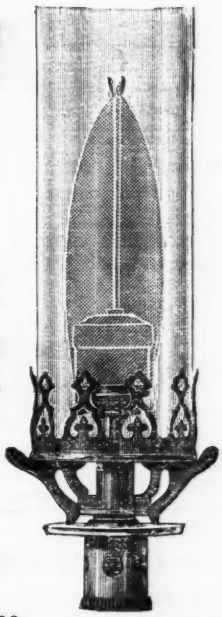


The CHAMPION INCANDESCENT GAS-BURNER.



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We beg to advise our numerous friends and customers that the Champion Incandescent Gas-Burner still holds the field, and that our sales are increasing daily, notwithstanding the threats of our competitors.

We maintain, as before, our Burner is not an Infringement of any existing Patent, and that it can be legally sold in the United Kingdom and the Colonies.

Mantles are sold in any quantity without restriction for use of particular kinds, and are very durable.

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Asbestos and Infusorial Earth for Fireproof Floors.

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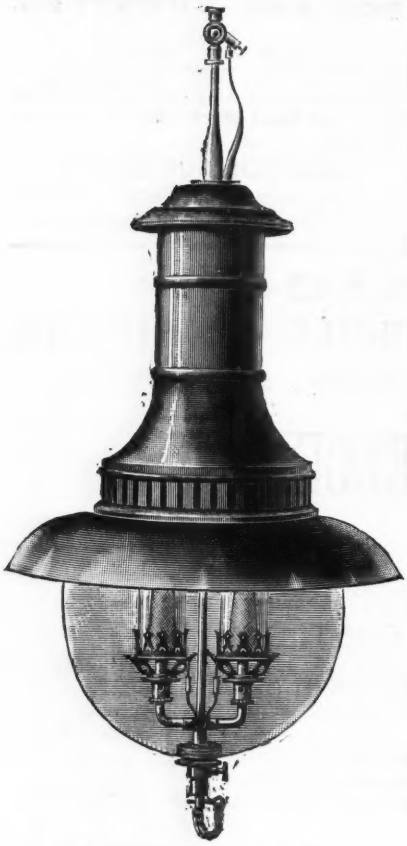
Sole Licensees for the United Kingdom and Colonies of the

"VERITAS" GAS ARC LANTERNS

Specially constructed for the

INCANDESCENT SYSTEM OF GAS LIGHTING.



G 42,262 ($\frac{1}{8}$ actual size).

The undisputed great advantages of the Incandescent System of Gas Lighting are frequently made void by the action on the Mantle of Damp, Dust, Wind, and Vibration; but these drawbacks have been entirely overcome by the perfect construction of the

"Veritas" Gas Arc Lanterns.

SPECIAL FEATURES.

DURABILITY (being made of Enamel Sheet Steel) combined with light and graceful **APPEARANCE.**

FREEDOM from **SHADOW.**

Perfect **PROTECTION** of **MANTLE. PROOF** against **WIND, RAIN,** and **DUST.**

SAFETY against **FIRE** for **INDOOR USE.**

LOW PRICE, combined with **EFFICACY.**

Made for **ONE, TWO, AND THREE BURNERS,** for **PILLARS** or to **SUSPEND.**

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For these reasons, our Lanterns are especially suited for Lighting PUBLIC BUILDINGS, FACTORIES, WAREHOUSES, SHOP WINDOWS, RAILWAY STATIONS, STREETS, and OUTDOOR USE GENERALLY.

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

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Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
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FOR PRICES AND PARTICULARS, APPLY TO

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BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

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Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

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HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

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OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

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Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

Following the acquisition of new Works situated in the heart of the cheapest Coal, Iron, and Steel Districts, we have added to our Technical Staff the

MOST SUCCESSFUL MODERN EXPERTS

in the designing of

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WE EARNESTLY WISH ENGINEERS TO INSPECT OUR LATEST DESIGNS.

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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

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GAS ENGINEERING CONTRACTORS,

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For **GASHOLDERS** and all kinds of **ENGINEERING APPARATUS.**

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For **COIN METERS,** their Patent Automatic is admitted to be one of the best and most reliable in the Market. Largely used in the Metropolis.

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Manufacturers of the **LIVESEY WASHER.**

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PATENT STREET-LANTERNS

100
PER CENT.
MORE LIGHT
CAN
BE OBTAINED
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ANY FLAME
BY
USING
THIS
LANTERN
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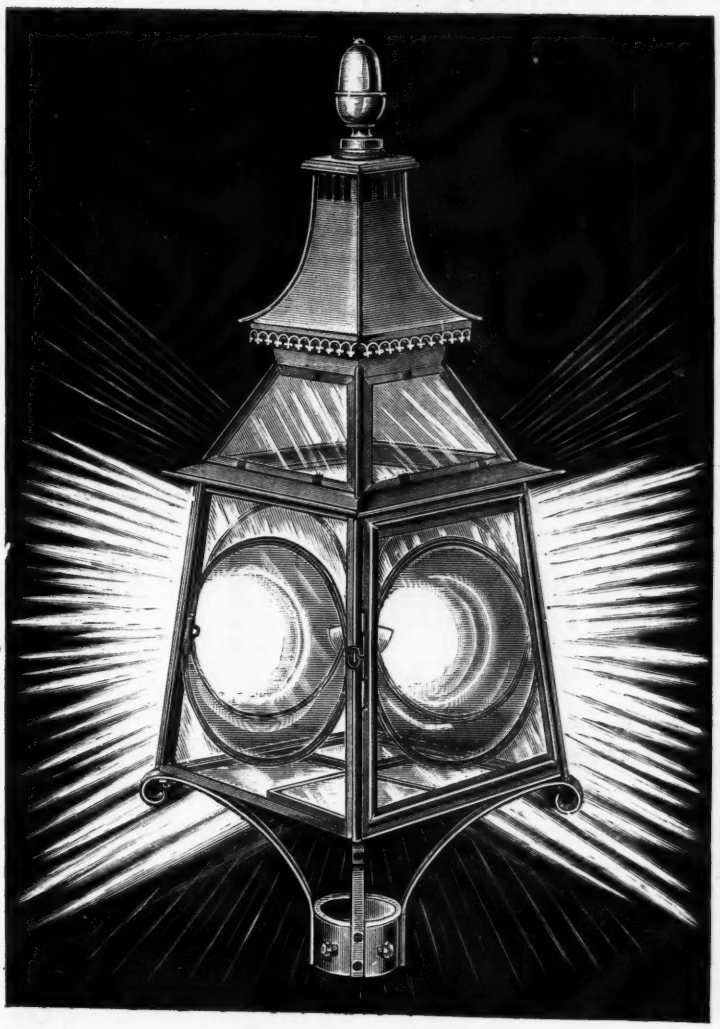

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PUBLIC BODIES,
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GAS COMPANIES
CAN SAVE
50 PER CENT.
BY USING
THIS
LANTERN
FOR
STREET
LIGHTING.

Can be fitted for
OIL
where required.

FIRST COST LITTLE MORE THAN ORDINARY LANTERNS.

Exceedingly Brilliant Light in direction of Lenses, Lights Footway all along between Lamps.

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where a Specimen Lamp can be seen.

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Full Particulars and Prices from S. CUTLER & SONS, MILLWALL, LONDON.

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RETORTS AND FIRE-BRICKS.
BEST QUALITY.
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[See Illustrated Advertisement, Feb. 4, p. 248.]

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GAS COAL AND CANNEL FACTORS,
Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.
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The Climax of Regenerative Gas Lighting!!

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A 280-CANDLE POWER PLAIN IRON LAMP,
CLASS A— **55/-**
LIGHT for LIGHT less than half the price of any other Regenerative Lamp.
Manufactured in England.
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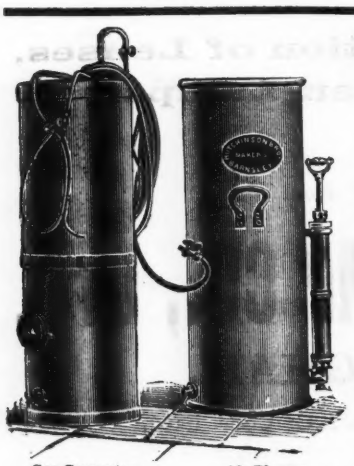

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IMPROVED LEAD-BURNING APPARATUS.

HUTCHINSON BROS.,
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SPECIALITY.
LEAD WORK FOR SULPHATE OF AMMONIA PLANTS,
BEST QUALITY OF MATERIAL AND WORKMANSHIP.
SATURATORS, all Lead, or Strong Sheet Lead, in Wood Casing,
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At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brussels	700,000 Cub. Ft.
Belfast	1,700,000 ,,	Liverpool	2,500,000 ,,
Glasgow	300,000 ,,	Tottenham	600,000 ,,
Santiago	400,000 ,,	Brighton	1,250,000 ,,
Swansea	700,000 ,,	Bath	1,000,000 ,,

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft.
Preston	1,500,000 ,,	New York	1,000,000 ,,
Southport	750,000 ,,	Newburgh, N.Y.	350,000 ,,
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In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

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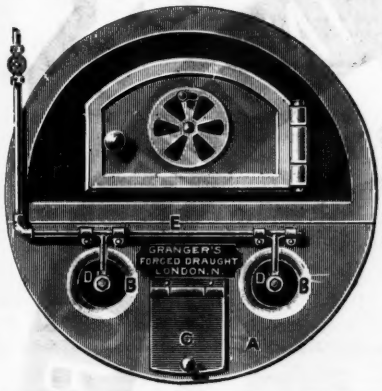

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Can be applied to any type of Boiler, and Burns all kinds of Cheap Fuel, Slack, Smudge, Pan Breeze, &c., also gives a large increase of Steam.

Many hundreds working at the leading Collieries, Mills, Factories, &c., &c.

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Gas-Bags for Mains. High Water-Boots. Woollen Miners' Jackets.

Delivery and Suction Hose, Gutta-Percha Acid Bottles, Leather Driving Bands, Woven Canvas Hose for Fire-Engines, Wedge and Square Gas-Bags, Air and Water Beds for Invalids, Oil Tarpauling Coats, Trousers, Hats, &c., Squeegees for cleansing Pavements, &c., Billiard and Bagatelle Cush, Tricycle Tyres, Leather Hose, Cotton Waste, Engine Cloths, Oils, &c., India-rubber Waterproof Garments for Walking, Driving, or Sporting Wear, Diving and Wading Dresses, Printers' Blankets, Iron Wheels and Rollers covered with India-rubber. Stokers' Gloves, 14s. 6d. per dozen.

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WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,
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Have confidence in drawing the special attention of **GAS ENGINEERS** to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

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ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
Telegrams: "ATLAS SHEFFIELD."

MASON'S GAS-PRODUCER

[PATENT 7467-93.]

This System is the "only" one which works **CONTINUOUSLY**. There are no Clinkers formed, consequently a constant and regular volume of gas is maintained. Labour is **considerably reduced**, one man being able to attend to **8 PRODUCERS**. Clinkering being dispensed with, there is a saving in Fuel of quite **10 PER CENT**. A bright clear gas is obtained from **COKE BREEZE**, which can be used for heating **RETORT-BENCHES**, and every description of **FURNACE** and **KILN**.

W. F. MASON, Ltd., ENGINEERS, MANCHESTER.

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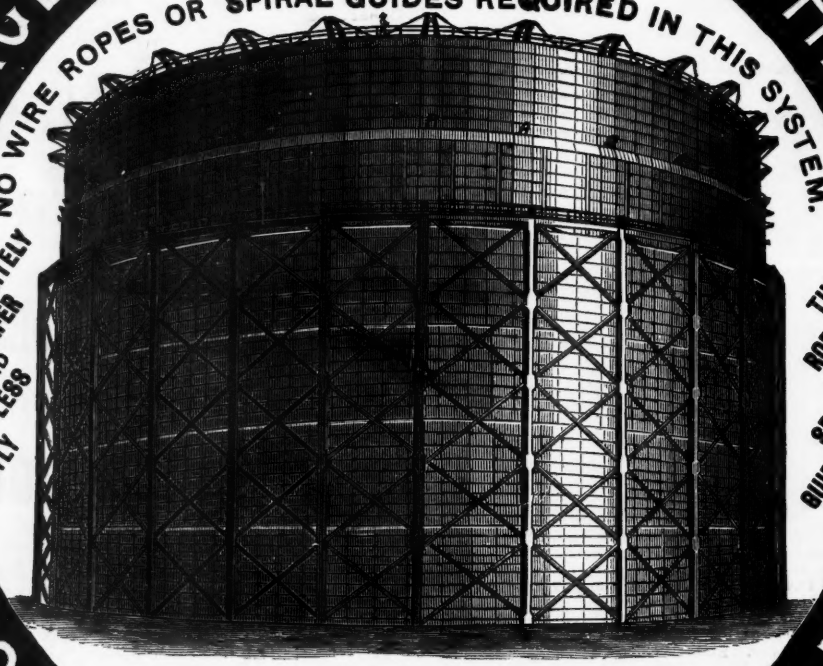
THE LARGEST GASHOLDER IN THE WORLD

CAPACITY 12 MILLION CUBIC FT.

GASHOLDERS OUR SPECIALITY

NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.

INFINITELY SAFER AND FAR LESS COSTLY THAN ROPES OR SPIRAL GUIDES.



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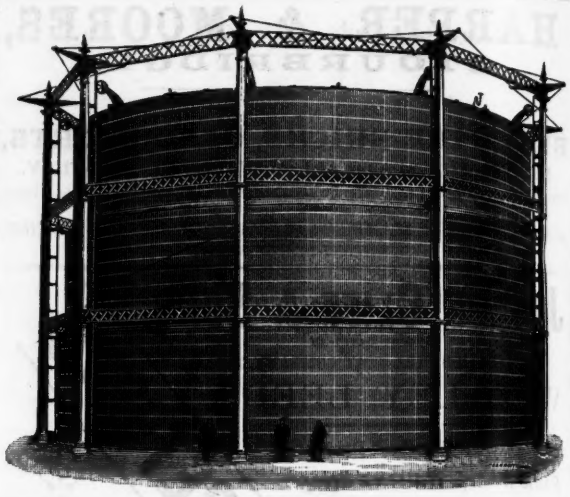

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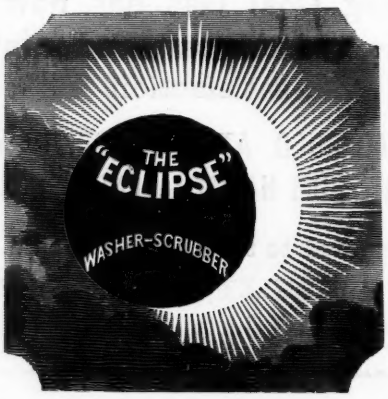

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